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ARCHEOLOGY.—*Four Hopewellian tumuli in western New York.*[1]

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In 1941 the writer explored two burial mounds in western New York for the Pennsylvania Historical and Museum Commission and eight years later opened two neighboring tumuli for the Indiana Historical Society.[2] All belong to the Hopewellian complex as seen in this region.

In no other area in northeastern North America were so many evidences of this prehistoric complex originally manifest. Yet the disheartening fact remains that of the literally hundreds of small conical burial mounds that once stood in this region, only a handful escaped early destruction. A few tantalizingly brief reports on the work of Reynolds, Larkin, Love, and Benedict exist in manuscript form, and there are occasional records of accidental discoveries and of amateur excavations. But these offer only glimpses here and there. Indeed, the fragmentary data presented in this article constitute a large portion of the evidence now above ground.

This becomes particularly unfortunate when it is realized that a knowledge of this prehistoric manifestation is of the first importance in current archeological thought in the Northeast. Perhaps the major problem in this area is that of explaining the intrusive linguistic and cultural position of the Iroquois. Contemporary workers tend to discount the older concept of a late migration of Iroquoian people with a fully formed, basically southern culture into the Northeast, in favor of successive cultural influences from the south, particularly the Ohio Valley, and the development *in situ* of Iroquoian culture.

Archeological evidence indicates that the largest, though probably not the first, southern movement into this region was made by people with a Hopewellian culture who migrated north along the west side of the Allegheny Mountains and from there entered the Northeast. It is significant that this is the only prehistoric complex known to have introduced southern traits into northern Iroquoia and to have also penetrated the homeland of the historic Cherokee, another branch of this linguistic family. For along the headwaters of the James River and in northwestern North Carolina there once stood a large number of tumuli, known only through the unpublished work of Fowke and Valentine, that differed in no way from the Northeastern Hopewellian tumuli. This is the only early culture known to have been shared by both Iroquois regions. As such it remains a favorite candidate for the distinction of having introduced the Iroquois language and sib organization into the Northeast, although no necessary coincidence between linguistic and material culture boundaries can be proved. It is believed that the foundations for basic Iroquois culture were introduced into their historic homes at this time and in this manner, bringing a transition from a food-gathering to a food-producing economy and firmly drawing the lines between Algonkian and Iroquoian cultures. Varied southern traits and complexes reached these northern farmers from this period on down into historic times.

Such an interpretation appears to be in keeping with both linguistic and ethnological evidence. On linguistic grounds, the separation of northern and southern Iroquois groups must have been quite early and probably originated in the Ohio drainage area.

[1] Received April 26, 1950.

[2] This report is published by permission of the secretaries of both institutions. All artifacts recovered were deposited in the Rochester Museum of Arts and Sciences, Rochester, N. Y.

And archeological suggestions of the synthesis of a maize industry with a northern hunting culture to produce in time the distinctive Iroquoian culture, merely confirms what we have independent reason to believe on the basis of ethnological data.

Thus it can be seen that the remnants of these once numerous tumuli are currently of major interest. Standing midway between the famed Ohio Hopewell center and the heart of Iroquoia, they offer evidence of the nature of the Hopewellian traditions that radiated out from southern Ohio and reached the northern Iroquois.

KILLBUCK MOUND, CATTARAUGUS COUNTY, N. Y.

Within the town of Killbuck, N. Y., there is a small plot of land that was not included in the original lease of the town site from the Iroquois of the Allegany Reservation. The Baltimore & Ohio Railroad cuts across its northern boundary, while the property of Lymon Blackman encloses the remaining sides. For years this tiny woodlot has been regarded by the Seneca as an Indian burial ground and indeed there is good evidence of interments here within the past century. It is important to note, however, that these historic graves were simple burials that lay some 30 feet west of a much-disturbed prehistoric mound on the site. Perhaps the latter had attracted more recent Indians who recognized it as a native cemetery. Our excavations here in 1949 were limited solely to the prehistoric mound.

Of earlier discoveries here there is no record. Previous excavators had removed a small portion of the central area and left holes along the northern side. But owing to a rather interesting feature, most of the burials were undisturbed. The mound, which overlooked the northern flood plain of the Allegany, had been built on the side of a pronounced slope or terrace bank. Though the mound was only 35 feet in diameter, the northern floor, which was the original ground surface, was 3 feet higher than the southern floor. On this sloping base a conical muond of light, sandy loam had been constructed. Erosion, and probably plowing, had so reduced the structure that it blended into the terrace contours, probably misleading earlier excavators, who confined their explorations to the northern portions.

The entire outline of the tumulus could be traced with ease, for the duff line of the old living surface clearly separated the mound structure from the original ground level. Above this stratum the mound attained, in 1949, a maximum center height of 2 feet 9 inches. Several burials, specifically numbers 2, 3, and 6, had apparently been made by scooping out shallow graves on the ground surface, for they lay a foot or more below this duff line. At one other point, an area roughly 2 feet in diameter near the mound center, this stratum was broken. Here, resting on the original ground surface, was a deposit, about the size of a bushel basket, of ash, charcoal, and hard, compact earth that had been subjected to intense heat. Covering this was a stone slab, 21 by 16 inches that had apparently been removed by earlier explorers and then replaced, for the earth immediately below the slab was disturbed. Nine burials were recorded:

Burial 1: Disturbed adult burial of which only long bone fragments remained.

Burial 2: Disturbed adult burial of which only long bone fragments remained.

Burial 3: Extended adult skeleton, probably the central burial; condition very poor; head to southwest, face to east; on each side of the cranium lay basin-shaped copper pieces, probably ear spools (Fig. 1, *l*); on the chest lay a crude pentagonal (?) slate gorget (Fig. 1, *n*) and two large chert flakes.

Burial 4: Calva of an infant.

Burial 5: Adult burial of which only the long bones and teeth remained; near the teeth lay seven spheroidal native copper beads (Fig. 1, *k*) and immediately to the east a deposit of limonite covering an unperforated, gorgetlike specimen (Fig. 1, *m*), a side-notched projectile point of chalcedony (Fig. 1, *g*), chert chips, possibly used as strike-a-lights, and an ovate scraper (Fig. 1, *a*). Vertebrae that lay just below the duff line appeared nearby.

Burial 6: Disturbed adult burial of which only the long bones remained.

Burial 7: Closely flexed skeleton of a child; head to the north but twisted about the face southeast; condition fair. Behind the cranium appeared several calcined bone fragments and two worked slabs of slate, possibly the raw material for gorgets.

Burial 8: Bundle burial of a child of about 10 years; condition very poor; bones disarticulate except for the ribs which were in general alignment.

Burial 9: Bundle burial of a child of about 8 years; condition very poor; lying directly beneath burial 8.

From the mound fill came a side-notched projectile point of Onondaga chert (Fig. 1, *h*) and a triangular projectile point of light grad chert (Fig. 1, *i*).

VANDALIA MOUNDS, CATTARAUGUS COUNTY, N. Y.

Two of the tumuli explored by the 1941 expedition stood on the Allegany Reservation, southwest of Vandalia, N. Y.; more specifically on the southern bank of an abandoned river channel of the Allegheny that now follows a more northerly course. Route 17 passes a few feet south of the first mound, and to the east a tiny confluent empties into the stagnant river bed.

Mound 1 had been repeatedly opened, one major excavation being made around 1920 by King Tanty Jimerson, a local Seneca showman and "trickster" of prodigious talent who dug directly into the mound center (Fig. 2). His

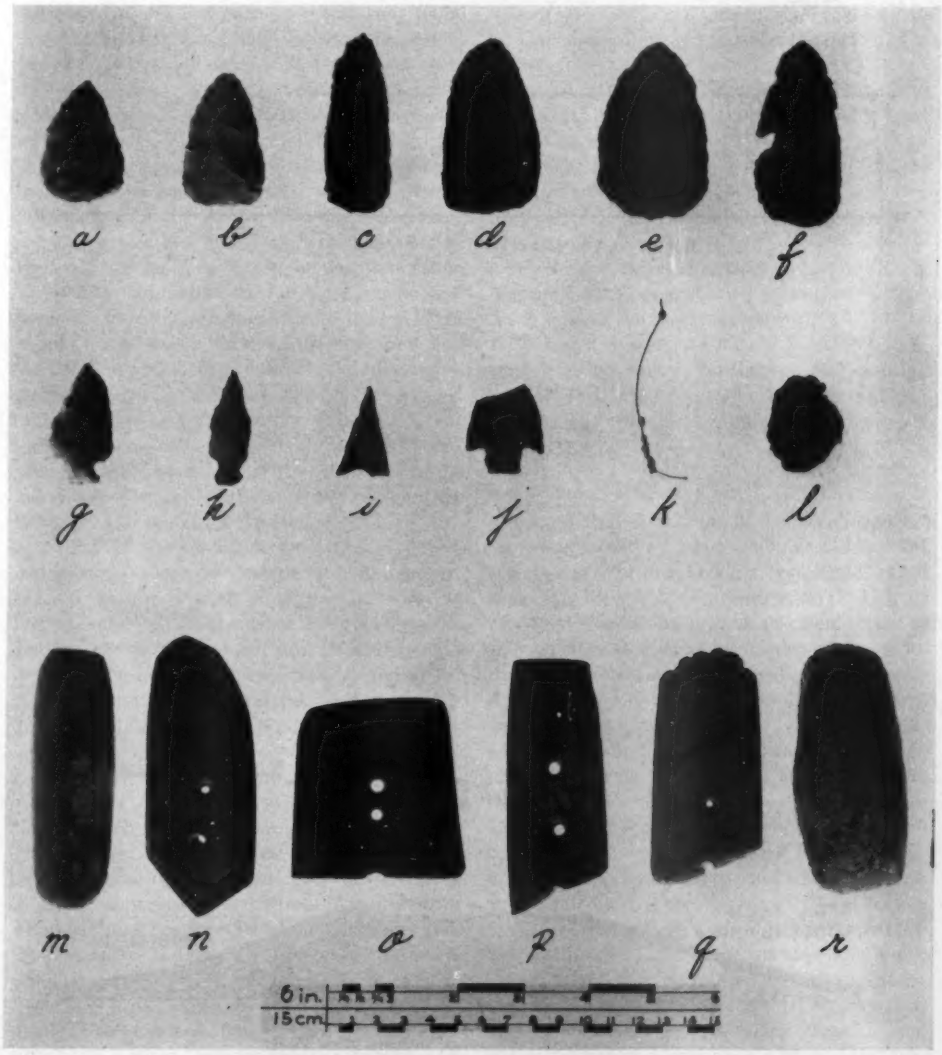

FIG. 1.—Artifacts from western New York mounds.

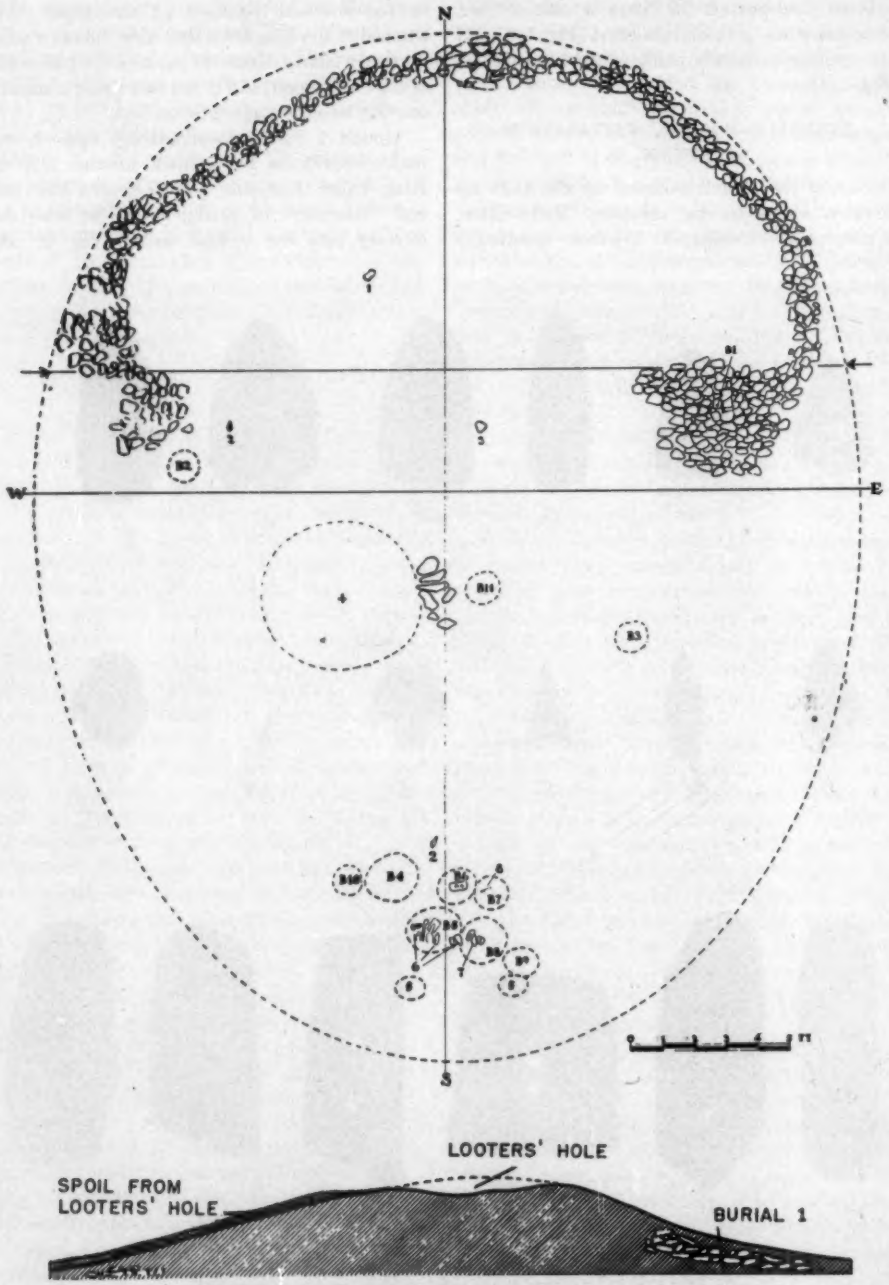

FIG. 2.—Vandalia mound, western New York.

discoveries remain unknown. However, human remains and cobblestone in the disturbed earth cast out from the mound center and remnants of a cist found *in situ* clearly showed that he had opened a centrally placed, cobblestone-covered grave of an uncremated adult male (burial 12). Immediately to the east of this cist, and also on floor level, lay burial 11, a disturbed cremation.

The original mound structure probably stood somewhat over 3 feet in the center and had a slightly oval or egg-shaped ground plan with a long axis of 32 feet. Sandy yellow soil, found adjacent to the mound, had been used throughout its construction and exhibited no lensed structure to the naked eye. No basal soil line was observed, thus suggesting floor preparation by complete removal of all humus accumulations.

On the ground level of the mound's northern periphery and just beneath the sod lay a pattern of unworked, waterworn cobblestones, averaging roughly 1 foot in width with a thickness of one and two stones (Fig. 2). In actual observation this stone design appeared far more symmetrical than accurate mapping disclosed. Slightly larger stones composed the center of the formation, and each end terminated in a circle of cobblestones. Directly beneath the northeastern circle appeared a few fragments of calcined bones (burial 1), red-ochre streaks, and small quantities of ash and charcoal. This latter, about three stones in thickness, was the only section of the design that followed the contour of the mound.

Burial 2, another small cremation, lay just outside the western cobblestone circle in a saucer-shaped depression sunk in the mound floor, 25 inches from the living surface. Charcoal streaks and stained earth appeared in a pocket immediately to the north-northeast. Nearby and about 8 inches under the mound floor lay the upper half of a large, crudely chipped, gray chalcedony projectile point.

Burial 3, a cremation covered with a small quantity of red ochre, was discovered on the southeastern side, 11 inches below the mound surface. Charcoal, ash, and chert chips were scattered sparingly throughout the grave.

In all, 12 burials were recorded: Numbers 4–10, all cremations, lay together at a uniform depth of 1½ feet below the original ground surface, in a subfloor pit. Here grave outlines were indistinct, for these latter skeletons were merely concentrations of calcined bones, each representing about half a quart, with fragments connecting all seven. A wealth of mortuary offerings accompanied them: three gorgets and a pentagonal pendant of Huronia slate, a native copper awl, powdered red hematite, a green stone celt, and five chert blades (Fig. 3).

Burial 4: Copper-stained cremation of an adult.

Burial 5: Cremation of an adult and child with first dentition. The adult tibiae were unburned, and on the left one rested a long slate gorget (Fig. 3, *o*), sandwiched between two flat stones, possibly for protection. Five cache blades of Onondaga chert accompanied the burial (Fig. 3, *b–e*).

Burial 6: Cremation of a young adult (?) accompanied by a gorget (Fig. 3, *r*) and a small ball of gray clay.

Burial 7: Child cremation with a double-pointed copper awl (Fig. 3, *j*).

Burial 8: Child cremation with gorget, celt, and pendant (Fig. 3, *p, g, l*).

Burial 9: Cremated remains of a young adult.

Burial 10: Copper-stained cremation with a small quantity of bright green clay.

In addition, from the mound fill came a hammerstone, net-sinker, anvilstone, and multiple pits on each side, plus a broken-stemmed projectile point or crude perforator of chert (Fig. 3, *a, f, n, i*).

MOUND 2

Immediately to the east of the first mound and on the adjacent property of Willie Gordon lay the remnants of a second low-lying tumulus. At the time of our excavations here in 1941, I examined this second mound and found most of the structure destroyed by erosion of the river-bank on which it stood. Calcined bone fragments and powdered red hematite were much in evidence. A few days earlier Mr. Gordon had discovered, within the mound, a cachelike deposit of the following artifacts: 12 cache blades of Onondaga chert (Fig. 1, *c–e*), 20 notched pebble net-sinkers, 2 steatite bowl fragments, a small celt (Fig. 1, *r*) and a slate gorget fragment (Fig. 1, *q*). The last specimen is polished at the break and serrated at the top.

An adjacent village site produced Laurentian-like artifacts and two fictile wares: a handful of Vinette I sherds and a larger number of similar sherds—the same color, temper, shape, paste, and hardness but lacking the interior cording.

Four other mounds were observed by the

writer in the immediate vicinity. All had been greatly disturbed by earlier explorers. In one of them, a larger oval mound roughly 30 by 60 feet, that lay in the general direction toward Chipmunk, the writer discovered a single cache blade of Onondaga chert (Fig. 1, *f*). From this same tumulus, King Tanty Jimerson is said to have recovered large copper awls.

POLAND CENTER MOUND, CHAUTAUQUA COUNTY, N. Y.

One of New York's largest tumuli stood on a high wooded hilltop on the Lindgren farm, overlooking the Conewango Valley and the now-abandoned town of Poland Center. Cheney (1859, pl. 3) described the structure in 1859, erroneously placing it in Conewango Township, Cattaraugus County:

> This work has some appearance of being constructed with the ditch and vallum outside of the mound, as in the Druid Barrows, but perhaps more accurately belongs to the class composed of several stages, as the Trocalli of the valley of Anahuac. The form of the tumulus is of intermediate character between an ellipse and the parallelogram; the interior mound, at its base, has a major axis of 65 feet, while the minor axis is 61 feet with an altitude above the first platform or embankment of 10 feet, or an entire elevation of some 13 feet. This embankment, with an entrance or gateway upon the east side 30 feet in width, has an entire circumference of 170 feet. As previously remarked, the work itself, as well as the eminence which it commands, and the ravine upon either side, are overshadowed by the dense forest. . . In making an excavation, eight skeletons, buried in a sitting position and at regular intervals of space, so as to form a circle within the mound, were disinterred. Some slight appearance yet existed to show that framework had enclosed the dead at the time of interment. These osteological remains were of very large size, but were so much decomposed that they mostly crumbled to dust. The relics of art here disclosed were also of a peculiar and interesting character—amulets, chisels and so forth, of elaborate workmanship, resembling the Mexican and Peruvian antiquities.

In 1905 Parker visited the site and noted that though considerably demolished by excavations, the mound still stood 9 or 10 feet high. He expressed some doubt, however, about the artificial nature of the surrounding ditch (Parker, 1922, p. 87).

Actually, the original height probably never exceeded 7½ feet, although to the eye it must have appeared far greater. At the time of our excavations there in 1949, the tumulus had a maximum height, excluding disturbed earth, of 6 feet 2 inches and a diameter of 52–45½ feet. A craterlike hole, presumably the excavation described by Cheney, marked the mound center, and other excavations, particularly along the sides, were much in evidence. No evidence of a surrounding ditch was observed, nor did test trenches indicate that such a feature had ever existed. Adjacent depressions, probably the source of mound earth, may have confused Cheney.

Our excavations here were limited to a 14-by-46-foot trench cut diagnonally through the mound center. On the periphery of the west side, just beneath the forest duff, we encountered a heavy concentration of stone slabs, apparently part of a central cist cast out by earlier explorers. Immediately beneath them lay still additional slabs, this time in undisturbed mound earth. They lay as an irregular pavement that followed the contour of the mound from the outer edge up the slope about 5 feet.

Without exception the mound earth consisted of the reddish-brown loam found adjacent to the tumulus. Beneath the structure was a hard, compact, 1½- to 2-foot gravel foundation, apparently of natural origin. This was broken by Cheney's excavation, which, incidentally, was far too small to have ever included eight separate burials. It was also broken at five other locations, all within 12 feet of the mound center. In three of these depressions, each but a few feet in diameter, lay two or three calcined bone fragments. A slate 3-holed gorget fragment, polished at the break (Fig. 1, *o*), accompanied one of these "burials." The remaining two held a few rotten, uncremated adult bones; the better of the two consisting only of a calva (head to the east) away from the mound center (missing face to the north), the tibiae and a 3-holed gorget fragment, again polished at the break and probably redrilled (Fig. 1, *p*). Both of these latter burials lay in graves cut into the gravel stratum that were of sufficient size and shape to enclose extended burials.

A corner-notched projectile point (Fig. 1, *j*) and the fragment of a blade or broad point appeared in the mound fill at ground level.

CONCLUSIONS

Sound opinion identifies these tumuli with the Northeastern Hopewellian complex, which had definite Ohio affinities. Known components occur in western New York,

along the banks of the upper Allegheny and the Genesee, the Finger Lakes country, both northern and southern shores of Lake Ontario and the eastern shore of Lake Erie, near the headwaters of the James, and in northwestern North Carolina. Late sites are also known in north-central Pennsylvania. It is perhaps significant that this distribution largely coincides with the habitat of the historic Iroquois.

Over this broad geographical range one finds exactly those traits that occurred in the above tumuli: the small earth mound, occasionally with peripheral stone construc-

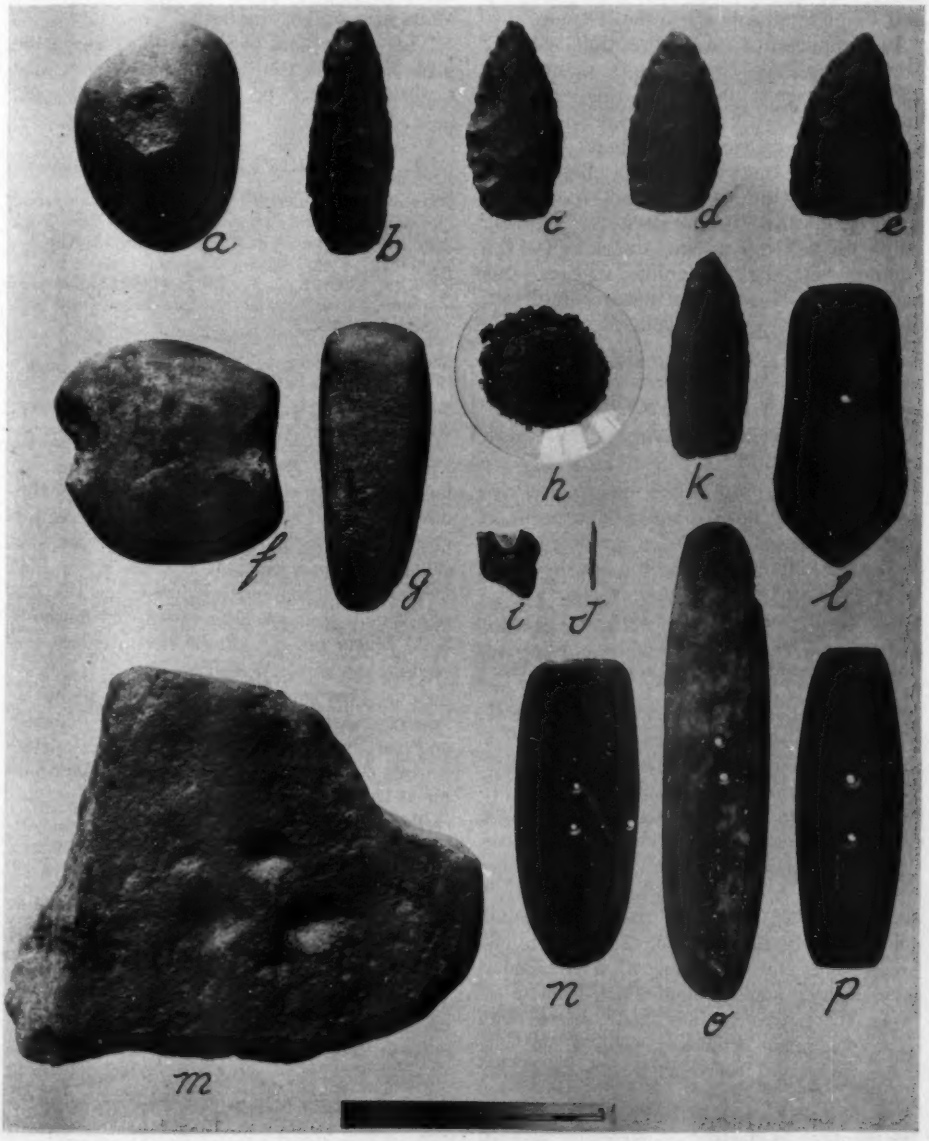

FIG. 3.—Artifacts from Vandalia mound, western New York.

tion; centrally placed, slab- or cobblestone-covered cist; cremated and flexed, bundle and extended burials; associated with the slate gorget, pentagonal pendant, copper awl, rude cache blade, copper bead, crude side-notched and triangular projectile points, strike-a-light kit, red and yellow ocher, copper ear-spool, stone celt, plus Vinette I and Point Peninsula Plain fictile types.

It is important to stress first that, without exception, all the Northeastern mounds on which data exist belong to this complex, and second, that these tumuli were originally quite numerous. Such findings tend to weaken the objections that a handful of Hopewellian emigrés could not have been the progenitors of such an extensive linguistic family as the Iroquois one. Association of the mounds with Laurentianlike villages sites and the non-Hopewellian nature of certain of the mound artifacts suggest that these early Woodland traditions were grafted on a late Archaic base, thereby producing a composite that contributed materially to the formation of the Point Peninsula Aspect. In short, the evidence presented here in no way contradicts current views on the relationship between the Northeastern Hopewellian complex and Iroquois culture but actually offers new supporting data.

The above seem to me to be conservative probabilities in the light of the very scanty traditions preserved to us in archeological data.

REFERENCES

CHENEY, T. APOLEON. *Illustrations of the ancient monuments in western New York*. New York State Cabinet of Natural History **13**. Albany, 1859.

PARKER, ARTHUR C. *The archaeological history of New York*. New York State Mus. Bull. **235**. Albany, 1922.

BOTANY.—*A new* Puya *from Bolivia*.[1]

LYMAN B. SMITH, Department of Botany, U. S. National Museum.

With few exceptions the species of *Puya* have extremely limited ranges and occur at high altitudes; so it is not surprising to find such a striking example as the one described below still unknown though within a relatively short distance of La Paz.

Puya fosteriana L.B. Smith, sp. nov. Fig. 1

Laminis foliorum supra glabris, subtus inter nervos minutissime albo-lepidotis; scapo brevissimo; inflorescentia densissime bipinnatim paniculata, cylindrica, brunneo-lanata; bracteis primariis reflexis, membranaceis, grosse serratis; floribus fasciculatis; bracteis florigeris acuminatis.

Flowering plant 1 meter high; leaves numerous, rosulate, 4–5 dm long, sheaths suborbicular, 9 cm in diameter, bearing a band of appressed cinereous scales beneath at apex, elsewhere glabrous, blades narrowly triangular, 5 cm broad at base, glabrous above, minutely pale-lepidote between the nerves beneath, laxly serrate with dark flat straight or hooked spines 9 mm long; scape very short, concealed by the leaves; inflorescence very densely bipinnate, thick-cylindric, rounded at apex, densely brown-lanate; primary bracts membranaceous, pale green, the suborbicular base equaling the sepals, the long narrowly triangular apex reflexed, coarsely serrate, branches much abbreviated, few-flowered; floral bracts broadly elliptic, long-caudate, exceeding the sepals, subentire, membranaceous; pedicels 1 cm long, rather slender; sepals linear-lanceolate, acute, 45 mm long, ecarinate, minutely and sparsely serrulate, submembranaceous; petals broadly elliptic, ultramarine (! Foster), dark purple at base (! Foster).

Type in the U. S. National Herbarium, nos. 1985828 and 1985829, collected in a cloud rock garden, La Rinconada, about 75 km east of La Paz, Department of La Paz, Bolivia, altitude about 4,400 meters, November 20, 1948, by Mulford B. Foster (no. 2573).

In its short scape and dense thick inflorescence *Puya fosteriana* resembles several other species of high altitudes. However, its membranaceous coarsely toothed primary bracts are quite distinctive, since this combination is found only in *P. vestita* André of Ecuador, a species with the floral bracts merely acute, broad sepals and sessile flowers. *P. brittoniana* Baker of Bolivia has thin

[1] Published by permission of the Secretary of the Smithsonian Institution. Received May 10, 1950.

bracts and narrow sepals like *P. fosteriana* but has a simple inflorescence, entire bracts, and much smaller sepals.

So far as known, *Puya fosteriana* grows at a higher altitude than any other member of the family, and so it is appropriately named for Mulford B. Foster, who has collected the highest number of bromeliad species both old and new.

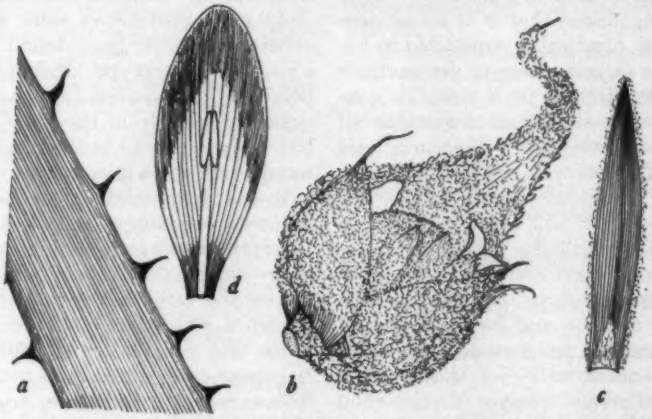

FIG. 1.—*Puya fosteriana*: *a*, Section of leaf-blade, × ½; *b*, inner view of branch and primary bract, × ½; *c*, inner view of sepal, × 1; *d*, petal and stamen, × 1.

ENTOMOLOGY.—*Generic names of the beetle family Oedemeridae and their type species.*[1] Ross H. ARNETT, JR.,[2] Bureau of Entomology and Plant Quarantine. (Communicated by R. E. Blackwelder.)

It has become an established fact that little can be done to stabilize our zoological nomenclature without the utilization of the genotype (or generotype) concept. Our nomenclature inevitably changes as the increase in our available material and knowledge of the world fauna results in the development of new zoological concepts of particular groups. As an aid to the zoologist confronted with this situation the nomenclaturist has made genotype designations. If the nomenclatural concept of the genus is properly understood by the zoologist and applied with the consciousness that zoological problems are not to be confused with nomenclatorial problems, an important step has been taken toward stabilization of nomenclature without *nomina conservanda*. This process of working out the genotypes of the older genera, and applying the law of priority to the findings, will be, I believe, a means of averting the crisis toward which modern workers are rapidly drifting—a zoological nomenclature buoyed up by the weak foundations of *nomina conservanda*.

The workers of the past three decades have supplied us with a number of genotype catalogues, among which are two that have served as patterns for the present work. Hyslop in 1921 (Proc. U. S. Nat. Mus. **58**, no. 2353) published a genotype catalogue of the Elateridae of the world (Coleoptera), and Pate in 1937 (Mem. Amer. Ent. Soc., no. 9) offered a genotype catalogue of the sphecoid

[1] Received March 20, 1950.

[2] One cannot do a piece of work of this nature for the first time without becoming indebted to many colleagues for considerable help. To thank publicly all who have contributed time and advice to this project is impossible. However, I feel I must mention V. S. L. Pate, with whom I was associated at Cornell University when this work was begun, and to whom I am indebted for much kind advice and encouragement; and H. S. Barber, of the Bureau of Entomology and Plant Quarantine, who has helped me over many a rough spot during the final stages of the work. My sincere thanks are here expressed to those two men in particular and to others on the staffs of the Division of Insects, of the National Museum, and the Division of Insect Identification of the Bureau of Entomology and Plant Quarantine, of the United States Department of Agriculture, who have helped me in this work.

wasps (Hymenoptera). An attempt has been made to use the best principles of each in developing the following catalogue of the types of the genera of Oedemeridae.

It is difficult to prepare a list of sources of genotype designations that is at all exhaustive; and it is practically impossible to assemble all the earliest genotype designations at one writing. Hence, no list can be considered final or be expected to stabilize all generic names, even on a nomenclatorial basis alone. The following attempt undoubtedly will be found to contain errors, the correction of which will cause reversals in our concepts of particular genera at a later date. However, I have consulted the standard sources for genotype designations with which I am familiar and have catalogued not only the earliest designations I am aware of, but later ones as well, even though these are considered invalid because of prior valid designations. This has been done with the realization that the earliest designation cited, for some reason unknown to me at present, may be invalid; and also with the realization that our code of nomenclature is at present in a state of flux and that changes in rules or interpretations may invalidate certain designations now accepted as valid. If that should happen, the next designation listed might apply, and by citing it here I hope to spare future workers hours of searching through old, inadequately catalogued, and often inaccessible literature. With five exceptions, which are noted in each case, every reference cited has been examined by me.

No attempt is made to indicate generic synonymy other than that resulting when genera are isogenotypic, except in rare cases where the genotypes have been well studied and are known to be synonymous. In all these latter cases, moreover, the authors of the synonymy studied the type specimens of the genotypic species and gave sound reasons for considering the names synonymous on zoological grounds. Only in these few instances has zoology been allowed to creep into this otherwise strictly nomenclatorial paper; and since such synonymy represents only personal opinion a generic name thus synonymized is always available for subsequent resurrection.

It is my intention to follow this catalogue with a series of papers dealing with these genera on zoological grounds. These studies will very probably result in a reduction of the now rather appalling number of generic names in this comparatively small family.

An annotated list of some general references that have been found valuable as sources of genotype designations is appended. These citations are necessarily mentioned repeatedly in the body of the work, but there only the author, date, and page number are given in each case.

In the alphabetical list of the genera that follows I have adopted this sequence of citation: (1) Generic name as originally proposed, with emendations recorded as separate names and listed in the proper alphabetical sequence with cross reference; (2) author's name and year of actual publication [not title-page date, where there is an established difference]; (3) reference to original description, or citation [this in rare cases may be supplemented by an additional reference if the name was originally proposed without included species, in which case the first reference to include species is cited and a note of explanation is given]; (4) the type species listed, either under the combination used in the original description, or that used when the designation was made if there is a difference, in the latter case with the original genus in parentheses following the citation of the original description of the species; this then followed by pertinent synonymy including original reference, reference to first publication of the synonymy, and further references when necessary; (5) the method of type fixation; (6) isogenotypic synonyms and cross references. I have tried to give full explanations of all cases of possible ambiguity; perhaps even to the extent of appearing needlessly verbose to those already familiar with the workings of a genotype catalogue and the metnods of nomenclaturists.

In the case of catalogue names, I have considered the genus as validly proposed if accompanied by one or more specific names with the author's name at least as a reference, provided that at least one of the specific names had been validly described.

This catalogue presumes to be correct and complete to December 31, 1948.

GENERA OF OEDEMERIDAE

Aedemera Olivier, 1795, Entomologie 3(50): 1. [Emendation of *Oedemera* Olivier, 1789].

Agasma Newman, 1850, Zoologist 8: app. CXVI.
Genotype: *Agasma semicrudum* Newman, 1850, *l.c.* CXVII. [Monobasic.]

Allagatha Semenow and Minassain, 1937, Bull. Soc. Ent. France 42: 227.
Genotype: *Allagatha decora* Semenow and Minassain, 1937, *l.c.* 228. [Monobasic.]

Alloxacis Horn, 1896, Proc. California Acad. Sci. (2) 6: 385, 395.
Genotype: *Nacerdes dorsalis* Melsheimer, 1846, Proc. Acad. Nat. Sci. Philadelphia 3: 55. [Designated by Lucas, 1920: 84.]

Alloxantha Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 814, 828.
Genotype: *Alloxantha lutea* Seidlitz, 1899, *l.c.* 829. [Designated by Lucas, 1920: 84.]

Anacerda Champion, 1927, Ent. Monthly Mag. 63: 249.
Genotype: *Anacerda leptidioides* Champion, 1927, *l.c.* 249. [Monobasic.]

Ananca Fairmaire and Germain, 1863 (Aug.), Ann. Soc. Ent. France (4) 3: 267.
Genotype: *Nacerdes pallens* Solier *in* Gay, 1851, Hist. Chile 5: 257, pl. 21, figs. 4, 4 a-b. [Designated by Champion, 1917, Ann. Mag. Nat. Hist. (8) 19: 170.]

Ananconia Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 816, 831.
Genotype: *Ananconia martini* (Fairmaire, Bull. Soc. Ent. France, 1896: 224 (*Chitona*). [Designated by Semenow, 1900: 646].

Anancosessinia Kôno, 1937, Ins. Matsum. 11: 139.
Genotype: *Anancosessinia tarsalis* Kôno, 1937, *l.c.* 140. [Monobasic.]

Anisochroa Semenow, 1900, Horae Soc. Ent. Ross. 34: 652.
Genotype: *Anisochroa zarudnyi* Semenow, 1900, *l.c.* 653. [Monobasic.]

Anogcodes Dejean, 1834, Cat. Col.: 228.
Genotype: *Anogcodes melanura* (Linnaeus), 1758, Syst. Nat., ed. 10: 403 (*Cantharis*). [Designated by Duponchel, 1841, 1: 550.] Isogenotypic with *Nacerda* Stevens, 1839.

Anoncodes Redtenbacher, 1845, Gatt. Deutsch. Käfer-fauna: 134. [No author or reference given, but the enlargement of this work, Fauna Austr. 1849: 56, 622, refers the name to *Anogcodes* Dejean, p. 250 (1838), by listing; it is accordingly to be considered an emendation of *Anogcodes*.]

Anoncodes Costa, 1852, Fauna Regni Napoli, Edemer.: 10. [Emendation of *Anogcodes* Dejean, 1834.]

Anoncodina Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 765, 786.
Genotype: *Nacerda ruficollis* (Fabricius), 1781, Spec. Ins.: 263 (*Necydalis*). [Present designation.]

Apterosessinia Blair, 1926, Ann. South Afr. Mus. 23: 357.
Genotype: *Apterosessinia peringueyi* Blair, 1926, *l.c.* 358. [Monobasic.]

Asclera Dejean, 1834, Cat. Col.: 228.
Genotype: *Necydalis sanguinicollis* (Fabricius), 1787, Mant. Ins. 1: 170. [Present designation.]

Ascleranoncodes Pic, 1915, Echange 31: 10.
Genotype: *Ascleranoncodes distincticornis* Pic, 1915, *l.c.* 10. [Monobasic.]

Asclerella Semenow, 1900, Horae Soc. Ent. Ross. 34: 648.
Genotype: *Asclerella tenera* Semenow, 1900, *l.c.* 651. [Monobasic].

Ascleronia Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 848, 850, 859.
Genotype: *Asclera semiflava* (Reitter), Deutsche Ent. Zeitschr. 1891: 31 (*Ischnomera*). [Present designation.]

Ascleropsis Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 848, 840, 860.
Genotype: *Asclera maculicollis* Ganglbaur, 1890, Horae Soc. Ent. Ross. 24: 42. [Present designation.]

Asclerosibutia Pic, 1914, Echange 30: 67.
Genotype: *Asclerosibutia lineaticollis* Pic, 1914, *l.c.* 67. [Present designation.]

Asclerostoma Fleischer, 1919, Ent. Blatt. 15: 169.
Genotype: *Asclerostoma reitteri* Fleischer, 1919, *l.c.* 169. [Monobasic.]

Baculipalpus Broun, 1880, Man. New Zealand Col. 1: 423.
Genotype: *Baculipalpus rarus* Broun, 1880, *l.c.* 423. [Monobasic].

Calopus Fabricius, 1775, Syst. Ent.: 182.
Genotype: *Cerambyx serraticornis* Linnaeus, 1758, Syst. Nat., ed. 10: 395. [Designated by Latreille, 1810: 430.] *Calopus serraticornis* Linnaeus, 1758, Syst. Nat., ed. 10: 395 (*Cerambyx*). [Designated by Blanchard, 1844: pl. 53, fig. 6.]

Chitona Schmidt, 1846, Linn. Ent. 1: 134.
Genotype: *Stenostoma variegata* Germain, 1824, Ins. Spec. Nov.: 167. [Monobasic.] *Chitona connexa* (Fabricius), 1798, Suppl. Ent. Syst.: 153 (*Leptura*). [Designated by Semenow, 1900: 647.] Not an originally included species.

Chromasclera Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 848, 850.
Genotype: *Asclera partitipennis* Fairmaire, 1892, Ann. Soc. Ent. Belg. 36: 158. [Monobasic.]

Chrysanthia Schmidt, 1846, Linn. Ent. 1: 17, 125. [Emendation of *Chrysarthia* Schmidt, 1844]

Chrysarthia Schmidt, 1844, Cat. Coleopt. Europa, ed. 2: 46. [Not seen.]

Genotype: *Cantharis viridissima* Linnaeus, 1758, Syst. Nat., ed. 10: 403. [Present designation.]

Colobostomus Fairmaire, 1885, Ann. Soc. Ent. France (6) 5: 452.

Genotype: *Colobostomus griseovestitus* Fairmaire, 1885, *l.c.* 453. [Monobasic.]

Copidita LeConte, 1866, New Species North Amer. Col. 1: 164.

Genotype: *Probosca quadrimaculata* Motschulsky, 1852, Études Ent. 1: 78. [Monobasic.]

Copodita Pic, 1923 (and later, consistently!, but no indication that it is a new name), Mél. Exot. Ent. 39: 32. [Misspelling of *Copidita* LeConte, 1866.]

Cycloderus Solier, 1851, *in* Gay, Hist. Chile 5: 252.

Genotype: *Cycloderus rubricollis* Solier, 1851, *l.c.* 253. [Monobasic.]

Dammarobius Broun, 1886, Man. New Zealand Col. 4: 846.

Genotype: *Dammarobius mollis* Broun, 1886, *l.c.* 846. [Monobasic.]

Danerces Westwood, 1875, Trans. Ent. Soc. London, 1875: 228.

Genotype: *Danerces luteicornis* Westwood, 1875, *l.c.* 229. [Present designation.]

Diasclera Reitter, 1913, Deutsche Ent. Zeitschr. 1913: 663.

Genotype: *Diasclera viridescens* Reitter, 1913, *l.c.* 663. [Monobasic.]

Diplectroides Champion, 1889, Biol. Centr.-Amer., Col., 4(2): 110 [no incl. sp.]; 126 (1890) [first incl. sp.].

Genotype: *Diplectroides longicornis* Champion, 1890, *l.c.* 126. [Original designation.] *Note:* Two included species, but one only provisionally included.

Diplectrus Kirsch, 1866, Berl. Ent. Zeitschr. 10: 210.

Genotype: *Diplectrus ferrugineus* Kirsch, 1866, *l.c.* 210 [Monobasic.]

Dityloidea Fairmaire and Germain, 1863, Ann. Soc. Ent. France (4) 3: 277.

Genotype: *Nacerdes janthina* Fairmaire and Germain, 1861, Col. Chile 2: 6. [Monobasic.]

Ditylonia Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 814, 827.

Genotype: *Ditylus cephalotes* Champion, 1889, Biol. Centr.-Amer., Col., 4(2): 119, pl. 5, fig. 23. [Designated by Lucas, 1920: 245.]

Ditylus Fischer-Waldheim, 1817, Mem. Soc. Imp. Moscow 5: 469. [No included named species, but a species is figured, pl. 15A, 1–6.] Dejean, 1821, Cat. Coleop.: 72. [*Ditylus* Fischer-Waldheim referred to, with *laevis* Fabricius the only included species. *Helops* is in parentheses after Fabricius's name, which refers this to Fabricius, 1792, Ent. Syst. 1(2): 120. This is then the first included species.]

Genotype: *Helops laevis* Fabricius, 1792, Ent. Syst. 1(2): 120. [Monobasic.] *Note:* Next reference to this genus is Fischer-Waldheim, 1820–22, Ent. Imp. Russ. 1: 31, [Not seen.] Sherborn gives the date of this page as May 1822.

ADDITIONAL GENOTYPE DESIGNATIONS: *Dytilus ruficollis* (Fabricius), 1781, Spec. Ins.: 263 (*Necydalis*). [Designated by Blanchard, 1844, pl. 53, fig. 8.] *Dytilus* Blanchard, 1844, is a misspelling of *Ditylus* Fischer-Waldheim, 1817. This is an invalid designation because it is not one of the first included species.

Ditylus helopioides Fischer-Waldheim, 1822 (May), Ent. Imp. Russ. 1: 31, pl. 5, fig. 1a–b. (Supposedly this paper refers to the figure in Fischer-Waldheim, 1817, cited above, and the species is usually cited as dating from 1817, but I have been unable to see this publication and therefore cannot verify this supposition). [Designated by Duponchel, 1845, 5: 89.]

Ditylus helopioides Fischer-Waldheim, 1817 [according to Crotch]. [Designated by Crotch, 1870: 229.] *Note: Ditylus helopioides* Fischer-Waldheim is a synonym of *Helops laevis* Fabricius, 1792, Ent. Syst. 1(2): 120, according to Germar, 1821, Mag. der Ent. 4: 401.

Synonym by genotype synonymy: *Mimetes* Eschscholtz, 1818.

Isogenotypic: *Microps* Megerle, 1821.

Diversipalpus Pic, 1938, Mel. Exot.-Ent. 70: 22.

Genotype: *Schistopselaphus bicoloripes* Pic, 1938, *l.c.* 22. [Monobasic.]

Dohrnia Newman, 1851, Zoologist 9: app. CXXXIII.

Genotype: *Dohrnia miranda* Newman, 1851, *l.c.* CXXXIII. [Monobasic.]

Dolichopyga Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 816, 832.

Genotype: *Dolichopyga acuminata* Reitter, Deutsche Ent. Zeitschr. 1890: 152 (*Probosca*). [Designated by Semenow, 1900: 647.]

Dolychopyga Lucas, 1920, p. 247. [Emendation of *Dolichopyga* Seidlitz, 1899.]

Dryopomera Fairmaire, 1897, Notes Leyden Mus. **18**: 238.
Genotype: *Dryops indica* Fairmaire, 1896, Ann. Soc. Ent. Belg. **40**: 54. [Monobasic.]

Dytilus Blanchard, 1844, Règ. Animal: pl. 53, fig. 8. [Misspelling of *Ditylus*.]

Eobia Semenow, 1894, Horae Soc. Ent. Ross. **28**: 455.
Genotype: *Asclera cinereipennis* Motschulsky, 1866, Bull. Moscou. **39**: 173. [Present designation.]

Exocalopus Broun, 1893, Man. New Zealand Col. **5**: 1170.
Genotype: *Exocalopus pectinatus* Broun, 1893, *l.c.* 1170. [Monobasic.]

Ezonacerda Kôno, 1934, Ins. Mats. **9**: 28.
Genotype: *Oedemera nigripennis* Matsumura, 1911, Journ. Coll. Sapporo **4**: 128. [Original designation and monobasic.]

Falsonerdanus Pic, 1943, Echange **59**: 7.
Genotype: *Falsonerdanus nigronotatus* Pic, 1943, *l.c.* p. 7. [Present designation.] *Note:* According to a strict interpretation of the Code, this genus is invalid because no genotype was originally designated. The present designation will, of course, validate the name.

Falsosessinia Pic, 1923, Mél. Exot.-Ent. **39**: 28.
Genotype: *Falsosessinia spinosa* Pic, 1923, (*l.c.* 29. [Present designation.]

Fissilamoncodes Neave, 1939, Nomen. Zool. **2**: 409. [Misspelling of *Fissilanoncodes* Pic, 1912.]

Fissilanoncodes Pic, 1912, Mél. Exot.-Ent. **1**: 4.
Genotype: *Fissilanoncodes maculicollis* Pic, 1912, *l.c.* p. 4. [Monobasic.]

Fissilonacerdes Pic, 1935, Mél. Exot.-Ent. **66**: 21.
Genotype: *Fissilonacerdes jaranus* Pic, 1935, *l.c.* p. 21. [Present designation.] See note under *Falsonerdanus* Pic.

Ganglbaueria Semenow, 1891, Horae Soc. Ent. Ross. **25**: 378.
Genotype: *Ganglbaueria collaris* Semenow, 1891, *l.c.* p. 379. [Monobasic.]

Holoxantha Semenow, 1894, Horae Soc. Ent. Ross. **28**: 457, 470.
Genotype: *Ditylus concolor* Brullé, 1838, *in* Webb and Berthelot, Hist. Nat. Canar. Col.: 70, pl. 1, fig. 13. [Original designation.]

Homomorpha Semenow, 1898, Wien. Ent. Zeit. **17**: 177.
Genotype: *Homomorpha crucifera* Semenow, 1898, *l.c.* 177. [Monobasic and original designation.]

Hypasclera Kirsch, 1866, Berl. Ent. Zeitschr. **10**: 210.
Genotype: *Hypasclera schistacea* Kirsch, 1866, *l.c.* 211. [Monobasic.]

Idgiomima Blair, 1926, Ann. South Afr. Mus. **23**: 373.
Genotype: *Asclerosibutia* (*Idgiomima*) *neavei* Blair, 1926, *l.c.* 373. [Original designation.]

Idgiomimula Blair, 1926, Ann. South Afr. Mus. **23**: 374.
Genotype: *Asclerosibutia* (*Idgiomimula*) *terminalis* Blair, 1926, *l.c.* 374. [Original designation and monobasic.]

Indanercer Pic, 1923, Mél. Exot. Ent. **39**: 24.
Genotype: *Indanercer nitidicollis* Pic, 1923, *l.c.* 24. [Present designation.]

Ischnomera Stephens, 1832, Ill. Brit. Ent., Mandib., **5**: 53.
Genotype: *Necydalis caerulea* Linneaus, 1767, Syst. Nat., ed. 12: 642. [Designated by Westwood, 1838: 31, appendix.]
Isogenotypic with *Oedemera* Olivier, 1789, and *Stenolytra* Dillwyn, 1829.

Isoloxantha Semenow, 1902, Rev. Russe Ent. **2**: 353. [New name proposed for *Xanthomima* Semenow, 1900 (not Warren, 1897).]

Ithaca Olliff, 1887, Proc. Linn. Soc. New South Wales (2) **2**: 153.
Genotype: *Ithaca anthina* Olliff, 1887, *l.c.* 154. [Monobasic.]

Lepturidea Fauvel, 1862, Bull. Soc. Linn. Normandie **7**: 150.
Genotype: *Lepturidea deplanchei* Fauvel, 1862, *l.c.* 152, pl. 10, figs. 32–39. [Monobasic.]

Lethonymus Marseul, 1857, Cat. Col. Eur.: 130
Genotype: *Lethonymus difformis* Marseul, 1857, *l.c.* 130. *Note:* The species *difformis* was described by Schmidt, 1846, Linn. Ent. **1**: 90, without a generic name but as genus no. 10. On page 17, *l.c.*, it is referred to as "10. n.g. anonym."[3] Marseul validated *difformis* by proposing the generic name *Lethonymus* [means "forgotten name"] and using *difformis* with it and at the same time referring to Schmidt, 1846. [Marseul publication not seen, not available in North America, but reprint in L'Abeille, 1867: 91, consulted.] [Monobasic.]

Loboglossa Solier, 1851, *in* Gay, Hist. Chile **5**: 254.
Genotype: *Loboglossa variipennis* Solier, 1851, *l.c.* 255. [Monobasic.]

Matusinhosa Pic, 1923, Mél. Exot. Ent. **39**: 27.
Genotype: *Matusinhosa maculata* Pic, 1923, *l.c.* 27. [Present designation.]

Mecopselaphus Solier, 1849, *in* Gay, Hist. Chile **4**: 430.

[3] Inasmuch as Schmidt died in 1843, and his monograph did not appear until 1846, it appears that the manuscript was incomplete at this point.

Genotype: *Mecopselaphus maculicollis* Solier, 1849, *l.c.* 430. [Present designation.] *Note:* This is probably not an oedemerid.

Melananthia Blair, 1926, Ann. South Afr. Mus. **23**: 354.
Genotype: *Melananthia costipennis* Blair, 1926, *l.c.* 355. [Original designation.]

Meloeditylus Pic, 1926, Mél. Exot. Ent. **47**: 31.
Genotype: *Meloeditylus reductus* Pic, 1926, *l.c.* 31. [Monobasic.]

Metasclera Broun, 1914, Bull. New Zealand Inst. **1**: 198.
Genotype: *Metasclera nigricans* Broun, 1914, *l.c.* 198. [Present designation.]

Micronacerdes Pic, 1923, Mél. Exot. Ent. **39**: 25.
Genotype: *Micronacerdes latefasciatus* Pic, 1923, *l.c.* 25. [Present designation.]

Microps Megerle, 1821 *in* Dejean (not Megerle *in* Dahl, 1823; Wagler, 1828; Stevens or Fischer-Waldheim, 1829; Wagler, 1830; Agassiz, 1833; Haliday, 1833; or Hallowell, 1856), Cat. Coleop.: 72.
Genotype: *Helops laevis* Fabricius, 1792, Ent. Syst. **1**(2): 120. [Monobasic.]
Note: Absolute synonym of *Ditylus* Fischer-Waldheim, 1817, because it was originally proposed as a synonym.

Microsessinia Pic, 1922, Mél. Exot. Ent. **35**: 18.
Genotype: *Microsessinia cyanescens* Pic, 1922, *l.c.* 18. [Present designation.]

Milneum Pic, 1923, Mél. Exot. Ent. **39**: 25.
Genotype: *Milneum inaequale* Pic, 1923, *l.c.* 25. [Monobasic.]

Mimetes Eschscholtz, 1818, Mem. Acad. Pétersb. **6**: 467.
Genotype: *Mimetes unicolor* Eschscholtz, 1818, *l.c.* 468. [Monobasic.] *Note:* Synonym by genotype synonymy: *Ditylus* Fischer-Waldheim, 1817. *Helops laevis* Fabricius, 1792, Ent. Syst. **1** (2): 120, is a synonym of *Mimetes unicolor* Eschscholtz, 1818, Mem. Acad. Pétersb. **6**: 467, according to Germar, 1821, Mag. der Ent. **4**: 401.

Mimodiplectrus Pic, 1923, Mél. Exot. Ent. **39**: 27.
Genotype: *Mimodiplectrus cyaneipennis* Pic, 1923, *l.c.* 27. [Monobasic.]

Mimoncomera Pic, 1923, Mél. Exot. Ent. **39**: 28.
Genotype: *Mimoncomera ocularis* Pic, 1923, *l.c.* 28. [Monobasic.]

Mimoselenopalpus Pic, 1924, Mél. Exot. Ent. **42**: 22.
Genotype: *Mimoselenopalpus bicoloriceps* Pic, 1924, *l.c.* 22. [Monobasic.]

Morpholycus Lea, 1917, Trans. Royal Soc. South Australia **41**: 287.
Genotype: *Morpholycus apicalis* MacLeay, 1872, Trans. Ent. Soc. New South Wales **2**: 313 (*Pseudolychus*). [Present designation.]

Nacerdes Dejean, 1834, Cat. Col.: 228.
Genotype: *Necydalis notata* Fabricius, 1775, Ent. Syst. **1**(2): 353. (Synonym of *Cantharis melanura* Linnaeus, 1758, Syst. Nat., ed. 10: 403, according to W. Schmidt, 1846, Linn. Ent. **1**: 29.) [Present designation.] *Note:* Synonyms by genotype synonymy: *Anogcodes* Dejean, 1834, and *Nacerda* Stevens, 1839. [*Nacerdes* is valid by position priority.]

Nacerda Faldermann, 1837, N. Mém. Soc. Imp. Nat. Moscou **5**: 139. [Not Seen.]

Nacerda Stevens, 1839, Man. Brit. Col., Mandib., **1**: 337.
Genotype: *Cantharis melanura* Linnaeus, 1758, Syst. Nat., ed. 10: 403. [Monobasic.] Isogenotypic with *Anogcodes* Dejean, 1834.

Nacerdasclera Munster, 1921, Norsk Ent. Tidsskr. **1**: 8.
Genotype: *Asclera* (*Nacerdasclera*) *sibirica* (Gebler), 1847, Bull. Moscou **20**(4): 510 (*Anoncodes*) (= *Oedemera sibirica* Gebler, 1830, *in* Ledebour, Reisen Altai **2**(3): 132). [Monobasic.] *Note:* This synonymy is as listed by Munster, *l.c.*

Nacerdochroa Reitter, 1893, Wien. Ent. Zeit. **12** 113.
Genotype: *Nacerdochroa plustschevskyi* Reitter, 1893, *l.c.* 114. [Monobasic.]

Nacerdoscuta Pic, 1915, Mél. Exot. Ent. **13**: 6.
Genotype: *Nacerdoscutass emirufa* Pic, 1915: *l.c.* 6. [Monobasic.]

Nerdanus Fairmaire, 1896, Notes Leyden Mus. **18**: 239.
Genotype: *Nerdanus coeruleus* Fairmaire, 1896, *l.c.* 239. [Monobasic.]

Ocularium Pic, 1922, Mél. Exot. Ent. **36**: 18.
Genotype: *Ocularium rufum* Pic, 1922, *l.c.* 18. [Monobasic.]

Oedechira Motschulsky, 1872, Bull. Moscou **45**(pt. 2): 54.
Genotype: *Oedechira paradoxa* Faldermann, 1837, Fauna Ent. Transc.: 147. [Present designation.] *Note:* Motschulsky says this is not the same as *Anoncodes adusta* Panzer [genotype of *Pachychirus* Redtenbacher, 1945], which was placed in synonymy by M. Mulsant.

Oedemera Olivier, 1789, Enc. Méth. **4**(1): 31. [No incl. sp., but a full description is given. The species were to follow in a later part; however, vol. 3 of "Entomologie" appeared before. There Olivier changed the spelling of *Oedemera* to *Aedemera* and included the first species, without reference to his 1789 publica-

tion. However, he later uses *Oedemera* again and refers to the 1795 publication.] Olivier, 1795, Entomologie 3(50): 1. [First incl. sp.]
Genotype: *Necydalis caerulea* Linnaeus, 1767, Syst. Nat., ed. 12: 642. [Designated by Latreille, 1810: 430; Curtis, 1832, British Ent. 2: pl. 390.] *Necydalis coerulea* Fabricius, 1775, Syst. Ent.: 209. [Designated by Westwood, 1838: 31 (appendix).] *Necydalis coerulea* Fabricius, 1775, Syst. Ent.: 209. [Designated by Blanchard, 1844, pl. 53, fig. 9.] *Oedemera femorata* Fabricius, 1792, Ent. Syst. 1(2): 74 (*Dryops*). [Designated by Crotch, 1870: 48; invalid, not an originally included species.]
Isogenotypic with *Ischnomera* Stephens, 1832, and *Stenolytra* Dillwyn, 1829.

Oedemerastra Seidlitz, 1899, Naturgesh. Ins. Deutschl. 5(2): 906, 923.
Genotype: *Oedemera* (*Oedemerastra*) *podagrariae* (Linnaeus) 1767, Syst. Nat., ed. 12: 642 (*Necydalis*). [Present designation.]
Isogenotypic with *Oncomera* Stephens, 1829.

Oedemerella Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 907, 933.
Genotype: *Oedemera* (*Oedemerella*) *croceicollis* Gyllenhall, 1827, Ins. Svec. 4: 523 (appendix). [Monobasic.]

Oedemerina Costa, 1852, Fauna Regni Napoli, Edemer.: 31.
Genotype: *Oedemerina lurida* (Gyllenhall), 1810, Ins. Svec. 2: 639 (*Necydalis*) (= by reference, *Necydalis lurida* Marsham, 1802, Ent. Brit.: 360). [Monobasic.]

Oedemeronia Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 906, 919.
Genotype: *Necydalis flavipes* Fabricius, 1792, Ent.Syst. 1(2): 355. [Monobasic.]

Oncomera Stephens, 1829, Nomencl. British Ins.: 20; Syst. Cat. Brit. Ins.: 251 (Aug.).
Genotype: *Necydalis podagrariae* Linneaus, 1767, Syst. Nat., ed. 12, 2: 642. [Monobasic.] *Necydalis podagrariae* Linneaus, 1767, *l.c.* [Designated by Westwood, 1838: 31 (appendix) for *Oncomera* Stephens, 1832, which is referable to Stephens, 1829.]
Isogenotypic with *Oedemerastra* Seidlitz, 1899.

Oncomerella Reitter, 1911, Fauna Germ. 3: 406 (note).
Genotype: *Oncomera marmorata* Erichson, 1841, Wagner's Reise Algier 3: 229 (*Oedemera*). [Monobasic.]

Oncomerina Seidlitz, 1899, Naturgesch. Ins. Deutschl. 5(2): 884, 885, 891.
Genotype: *Oedemera murinipennis* Kiesenwetter, 1859, Berl. Ent. Zeitschr. 3: 192, pl. 3, fig. 9. [Monobasic.]

Opsimea Miller, 1880, Verh. zool.-bot. Ges. Wien 30: 224.
Genotype: *Opsimea ventralis* Miller, 1880, *l.c.* 225. [Monobasic.]

Oschaninia Semenow, 1898, Wien. Ent. Zeit. 17: 175.
Genotype: *Ganglbaueria wilkinsi* Heyden, Deut. Ent. Zeit., 1894: 52, fig. [Original designation and monobasic.]

Oxacis LeConte, 1866, New Species North Amer. Col. 1: 165.
Genotype: *Asclera cana* LeConte, 1854, Proc. Acad. Nat. Sci. Philad. 7: 225. [Present designation.]

Pachychirus Redtenbacher, 1845, Gatt. Deut. Käfer-fauna: 134, 156.
Genotype: *Necydalis adusta* Panzer, 1795, Deutschl. Insectenfaune: 279. [Monobasic.]

Patiala Lewis, 1895, Ann. Mag. Nat. Hist. (6) 15: 434.
Genotype: *Patiala antennata* Lewis, 1895, *l.c.* 434. [Original designation.]

Peronocnemis Fairmaire, 1886, Ann. Soc. Ent. France (6) 6: 352.
Genotype: *Peronocnemis davidis* Fairmaire, 1886, *l.c.* 352. [Monobasic.]

Perocnemis Schenkling, 1915, Col. Cat. 65: 12. [Emendation.]

Phytilea Broun, 1893, Man. New Zealand Col. 5: 1171.
Genotype: *Phytilea propera* Broun, 1893, *l.c.* 1172. [Monobasic.]

Piras Champion, 1889, Biol. Centr.-Amer., Col., 4 (2): 110 (1889) [no incl. sp.], 164 (1890) [first incl. sp.].
Genotype: *Piras nasalis* Champion, 1890, *l.c.* 165. [Present designation.]

Platelytra Gemminger and Harold, 1870, Cat. Col. 7: 2166. [Emendation of *Platylytra* Fairmaire and Germain, 1863.]

Platylytra Fairmaire and Germain, 1863, Ann. Soc. Ent. France (4) 3: 278.
Genotype: *Platylytra vitticollis* Fairmaire and Germain, 1863, *l.c.* 279. [Monobasic.]

Probosca Schmidt, 1846, Linn. Ent. 1: 17, 130.
Genotype: *Probosca viridana* Schmidt, 1846, *l.c.* 130 (*Nacerdes*). [Designated by Semenow, 1900, p. 647.]

Proboscea Schmidt, 1846, *l.c.* p. 131. [Probably a misspelling of *Probosca*.]

Pselaphanca Blair, 1927, Ann. Mag. Nat. Hist. (9) 20: 165.
Genotype: *Selenopalpus lateritius* Fairmaire, Rev. Zool., 1849: 457. [Original designation.]

Pseudananca Blackburn, 1893, Trans. Royal Soc. South Australia **17**: 135.
Genotype: *Pseudananca ruficollis* Blackburn, 1893, *l.c.* 135. [Monobasic.]

Pseudolycus Guérin, 1833, Ann. Soc. Ent. France **2**: 155.
Genotype: *Pseudolycus marginatus* Guérin, 1833, *l.c.* 156, pl. 7, A, figs. 1–6. [Present designation.]

Pseudonerdanus Pic, 1923, Mél. Exot. Ent. **39**: 24.
Genotype: *Pseudonerdanus luteonotatus* Pic, 1923, *l.c.* 24. [Monobasic.]

Rhinoplatia Horn, 1868, Trans. Amer. Ent. Soc. **2**: 137.
Genotype: *Rhinoplatia ruficollis* Horn, 1868, *l.c.* 138. [Monobasic.]

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Genotype: *Rhopalobrachium clavipes* Boheman, 1858, *l.c.* 110, pl. 1, fig. 8, 8a–g. [Monobasic.]

Saloninus Fairmaire, 1891, Ann. Soc. Ent. Belg. **35**: Bull: CXXXIII.
Genotype: *Saloninus nebulosus* Fairmaire, 1891, *l.c.* CXXXIII. [Original designation.]

Schellia Reitter, 1914, Ent. Blatt. **10**: 49.
Genotype: *Schellia sitaroides* Reitter, 1914, *l.c.* 50 [Monobasic.]

Schistopselaphus Fairmaire, 1896, Notes Leyden Mus. **18**: 126.
Genotype: *Schistopselaphus apicatus* Fairmaire, 1896, *l.c.* 127. [Monobasic.]

Selenopselaphus Gemminger and Harold, 1870, Cat. Col. **7**: 2168. [Emendation of *Selenopalpus* White, 1846.]

Selenopalpus White, 1846, Voy. *Erebus* and *Terror*, Ins.: 13.
Genotype: *Selenopalpus chalybaeus* White, 1846, *l.c.* 13. [Present designation.]

Sessinia Pascoe, 1863 (Jan.), Journ. Ent. **2**: 45.
Genotype: *Nacerdes livida* Fabricius, 1775, Syst. Ent.: 124 (*Lagria*). [Designated by Semenow, 1894: 458.]

Sisenes Champion, 1889, Biol. Centr.-Amer., Col. **4**(2): 111 (1889) [no incl. sp.], 130 (1890) [first incl. sp.].
Genotype: *Sisenes suturalis* Champion, 1890, *l.c.* 141, pl. 6, fig. 23. [Present designation.]

Sisenopiras Pic, 1923, Mél. Exot. Ent. **39**: 26.
Genotype: *Sisenopiras gounellei* Pic, 1923, *l.c.* 26. [Present designation.]

Sparedropsis Heyden, 1886, Deutsche Ent. Zeitschr. **30**: 191.
Genotype: *Sparedropsis fuscus* Heyden, 1886, *l.c.* 191. [Monobasic.]

Sparedrus Dejean, 1821, Cat. Col.: 72.
Genotype: *Calopus testaceus* Andersch, 1797, *in* Hoppe, Ent. Taschenbuch: 165. [Monobasic.] *Sparedrus testaceus* Schoenherr, 1817 (refers to Andersch, 1797). [Designated by Blanchard, 1844: pl. 53, fig. 7.]

Spharedrus Kuhnt, 1912, Ill. Best.-Tab. Käf. Deutschl.: 689, 690. [Misspelling of *Sparedrus* Dejean.]

Stenaxis Schmidt, 1846, Linn. Ent. **1**: 17, 87.
Genotype: *Oedemera annulata* Germar, 1824, Ins. Spec. Nov.: 166. [Monobasic.]

Stenolytra Dillwyn, 1829, Mem. Col. Ins. Swansea: 61.
Genotype: *Stenolytra caerulea* (Linnaeus), 1767, Syst. Nat., ed. 12: 642 (*Necydalis*). [Monobasic.] *Note:* The title page of Dillwyn's publication states "Not Published." However, it was printed and copies are available.
Isogenotypic with *Oedemera* Olivier, 1789, and *Ischnomera* Stephens, 1832.

Stenostoma Latreille, 1810, Consid. Gen.: 217.
Genotype: *Leptura rostrata* Fabricius, 1787, Mant. Ins. **1**: 159 (*Lagria*). [Designated by Latreille, 1810: 430; Crotch, 1870: 223.]

Stenostomidea Perroud, 1864, Ann. Soc. Linn. Lyon **11**: 126.
Genotype: *Stenostomidea grevilleae* Perroud, 1864, *l.c.* 127. [Monobasic.]

Techmessa Bates, 1874, Ann. Mag. Nat. Hist. (4) **13**: 113.
Genotype: *Techmessa concolor* Bates, 1874, *l.c.* 113. [Present designation.]

Techmessodes Broun, 1893, Man. New Zealand Col. **5**: 1173.
Genotype: *Techmessodes versicolor* Broun, 1893, *l.c.* 1173. [Monobasic.]

Thaccona Walker, 1859, Ann. Mag. Nat. Hist. (3) **3**: 260.
Genotype: *Thaccona dimelaena* Walker, 1859, *l.c.* 260. [Monobasic.]

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Genotype: *Thelyphassa diaphana* Pascoe, 1876, *l.c.* 58. [Monobasic.]

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Genotype: *Trichananca victoriensis* Blackburn, 1891, *l.c.* 341. [Monobasic.]

Uroplatosisenes Pic, 1934, Mél. Exot. Ent. **63**: 23.
Genotype: *Uroplatosisenes depressicornis* Pic, 1934, *l.c.* 24. [Present designation.] *Note:* Strict interpretation of the Code makes this genus invalid because no genotype was originally designated. However, it is here accepted. See note under *Falsonerdanus* Pic.

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Genotype: *Vasaces aeneipennis* Champion, 1890, *l.c.* 128, pl. 6, figs. 7, 7a–c. [Present designation.]

Vodomarus Champion, 1889, *l.c.* 111 (1889) [no incl. sp.], 143 (1890) [first incl. sp.].

Genotype: *Vodomarus quadrifoveolatus* Champion, 1890, *l.c.* 143. [Monobasic.]

Xanthochroa Schmidt, 1846, Linn. Ent. 1: 17, 35.

Genotype: *Oedemera carniolica* Gistl, 1832, Faunus 1: 150. [Present designation.]

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Genotype: *Xanthochroina auberti* Abeille, Bull. Soc. Ent. France, 1876: CLXVI. [Monobasic.]

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Genotype: *Zubkovia turcomanica* Semenow, 1894, *l.c.* 468. [Monobasic.]

THE MORE IMPORTANT PUBLICATIONS GIVING GENOTYPE DESIGNATIONS FOR GENERA OF OEDEMERIDAE

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ZOOLOGY.—*Description of a new species of amphipod of the genus* Corophium *from Adyar, Madras, India.*[1] K. NAGAPPAN NAYAR, University of Madras, S. India. (Communicated by Waldo L. Schmitt.)

Barnard (1935), Chilton (1921), Giles (1885, 1888, 1890), Stebbing (1940), and Walker (1904, 1905, 1909) have listed and described over 120 species of amphipods from Indian waters. While studying a collection of over 40 forms from the Madras coast, the author found the present form to be a new species. Of the 37 species known of the tube-dwelling genus *Corophium*, two have been recorded from India. The present form, the third species, is the first to be recorded from Madras. Hence a full account of this new species and a comparison with the other Indian species were deemed fitting.

Large numbers of both males and females of this amphipod are found living in the

[1] Received May 8, 1950.

muddy bottom of the Adyar brackish water (under the San Thome Bridge). The females are more numerous than the males. These amphipods occur through out the year and are hardy enough to withstand the dilution of the medium when the river is cut off from the sea from April to October.

Corophium madrasensis, n. sp. Fig. 1

Male.—Head with front between the side lobes straight, slightly convex, or with a very low central obtuse-angular projection; eyes dark, small, and slightly oval. The side plates of the first peraeon segment are apically fringed with three plumose setae. Antenna 1 reaching beyond the proximal end of the fifth joint of antenna 2; inner margin of the first joint fringed with rather long setae but without spines; the second joint a little shorter than the first and slightly more than twice as long as the third; flagellum not quite so long as the peduncle and composed of about 12 joints. Antenna 2, fourth joint more than twice as long as the third with lower margin produced distally into a strong forward-curving tooth below and a small tooth above; and a low narrow tooth or ridge at the lower inside surface at the proximal end; fifth joint nearly as long as the fourth; flagellum composed of one long and two short joints; the lower margins of the third, fourth, and fifth peduncular joints and the flagellum bear groups of long setae. First joint of the mandibular palp not produced distally where the characteristic plumose seta is borne. Second joint longer than the first.

The first gnathopod with the third and fifth joints densely setose, the fifth tapering distally, the palm slightly oblique, convex and front margin of joint fringed with slender spines; the seventh joint smooth and curved. The second gnathopod has the fourth joint fringed with the customary double row of extremely long setae and the seventh joint with three broad teeth.

Peraeopods 1 and 2, second and fourth joints moderately expanded; seventh joint as long as the sixth. Peraeopods 3 and 4 normal. Peraeopod 5 reaching beyond uropod 1, second joint well expanded and fringed on rear margin with long plumose setae.

The peduncle of uropod 1 has a pointed triangular cone at its distal end and a row of about four spines on outer margin and three spines on the inner margin. The outer ramus has three spines on outer edge besides the four or five terminal spines and without any spines on the inner margin. The inner ramus has three lateral spines on the outer margin in addition to the three terminal spines and no spines on the inner margin. The peduncle of uropod 2 is smaller in size and has one thin spine at the distal end on the outer side. The rami are subequal in length and have no spines on their inner margins. The outer ramus has two lateral spines on its outer margin while the inner ramus bears only the terminal spines. Uropod 3 is very short. The ramus is shorter than the peduncle; one or two small and slender spines arise from the distal end of the inner margin of the peduncle. The ramus is provided distally with eight or nine long slender spines. Telson triangular, with obtusely pointed apex. Length of the male from front of the head to the end of uropods about 4.5 mm.

Female.—The female differs from the male principally in antenna 1 and antenna 2 and also in the number of spines in the uropods. Antenna 1 reaching to the distal end of the fifth joint of antenna 2; inner margin of first joint of peduncle bears three proximal spines and a few small setae; lower margin bears two to five distal forward-pointing spines; flagellum slightly shorter than the peduncle and composed of about eight to nine joints. Antenna 2, much smaller and not so strong as in male; the third joint bears two small spines at the lower distal end; fourth joint has four spines along the lower edge and two spines on the inner surface. The fifth joint is setose but devoid of any spines on the inner margin but has a large number of long setae. Flagellum composed of one long and one or two short joints. Gnathopods and peraeopods are like those of the male.

The peduncle of uropod 1 is produced distally into a triangular lobe as in the male; the outer margin bears five or six spines and inner margin with four spines. Outer ramus has four spines on outer margin and without any spines on the inner margin. The inner ramus has four spines on the outer margin and no spines on the inner margin. The peduncle of uropod 2 with two small spines at the distal end. The outer ramus has four spines on the outer margin and the inner ramus with one spine on the outer margin. Both rami without spines on their inner margins. Uropod 3 is like that of the male.

Type.—A male, U.S.N.M. no. 90736, taken in the muddy bottom of the Adyar, brackish water (under the San Thome Bridge), Madras, India, by K. Nagappan Nayar.

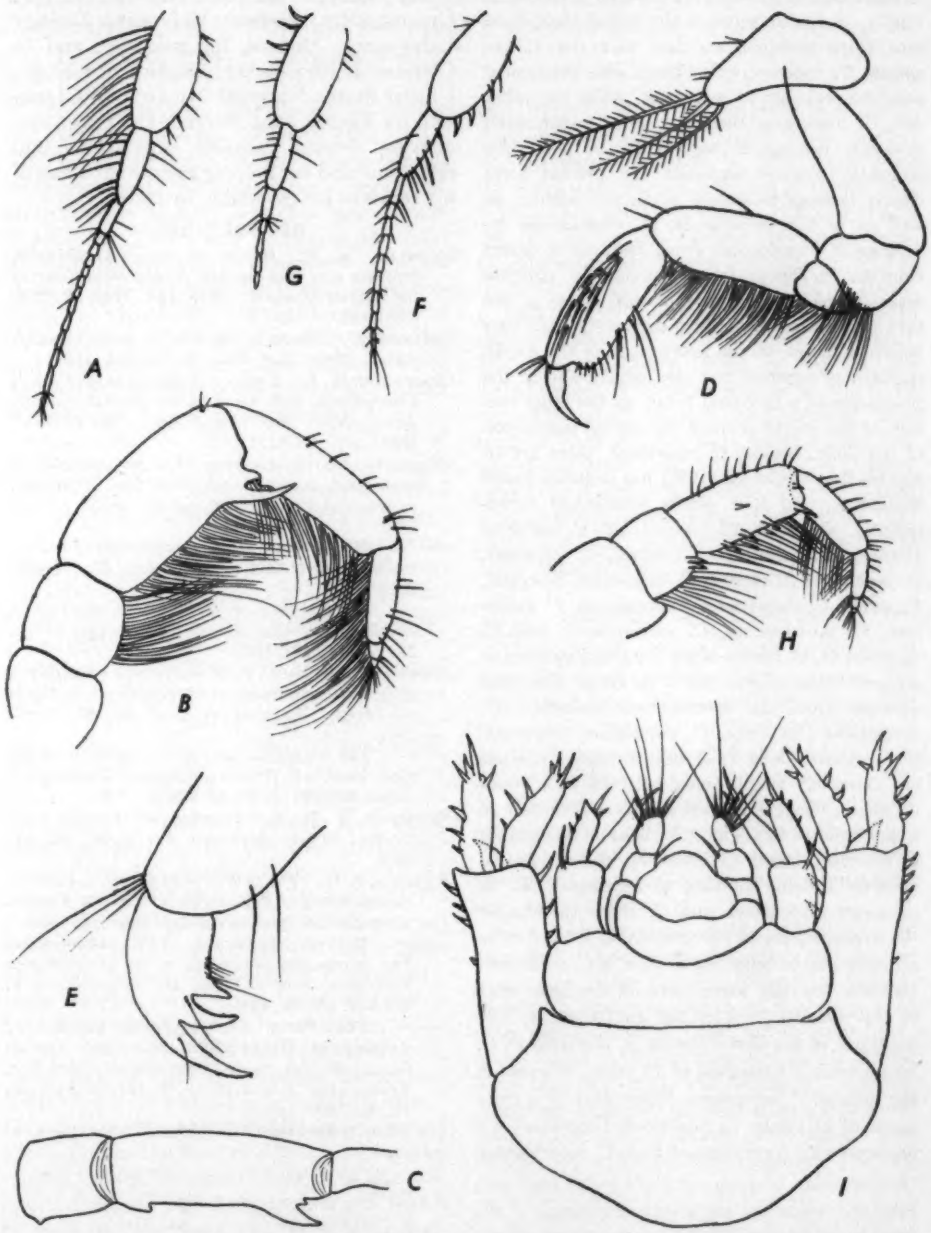

FIG. 1.—*Corophium madrasensis*, n. sp.: Male: *a*, Left antenna 1 from above, × 45; *b*, left antenna 2, side view, × 45; *c*, right antenna 2 from below, × 45; *d*, gnathopod 1, × 90; *e*, end of gnathopod 2, ×177. Female: *f*, Left antenna 1, side view, × 45; *g*, left antenna 1 from above, × 45; *h*, left antenna 2, inside view, × 45; *i*, urosome and uropods, × 90.

Taxonomic remarks.—Following Crawford (1937), in his division of the genus *Corophium* into three sections, we find that the Indian species *C. triaenonyx* Stebbing, with segmented urosome, belongs to section A, while the other one, *C. crassicorne* Brazelius, with unsegmented urosome, belongs to section B. In possessing separate urosome segments the present form clearly belongs to section A. In this feature, as well as in the peraeopods, *C. madrasensis* resembles *C. triaenonyx* a great deal, but it differs from *C. triaenonyx* in not having six plumose setae fringed on the apex of side plates of the first peraeon segment; also in having only four spines in a row on the lower edge on the fourth segment of antenna 2 of the female; and in the possession of a proximal tooth on the inner surface of the fourth joint of the second gnathopod of the male. Besides *C. triaenonyx*, there are 18 species that Crawford (1937) has included under section A, and four others established subsequently. Of these 22 species, 12—*C. volutator* (Pallas), *C. arenarium* Crawford, *C. salmonis*, *C. spinicorne* Stimpson, *C. maeoticum* Sowinski, *C. nobile*, *C. chelicorne*, *C. spinulosum*, *C. robustum*, *C. mucronatum*, *C. curvispinum*, and *C. monodon* G. O. Sars— show no differentiation in segment four of antenna 2 in either sex, thus differing from the species here described. *C. aculeaturm* Chevreux, *C. annulatum* Chevreux, *C. runcicorne* Della Valle, and *C. affine* Bruzelius are extremely small, being only 0.5 to 1.5 mm in length, whereas *C. madrasensis* is definitely of larger build (4 to 4.5 mm). *C. setosum* Shoemaker is not only small (2 mm) but differs also in antenna 1 being as long as antenna 2. In *C. stimpsoni* Shoemaker and *C. brevis* Shoemaker the seventh joint of the gnathopod 2 has five or six teeth on the inner edge, while in *C. madrasensis* there are only three teeth on the inner edge of the seventh joint of the gnathopod 2. The flagellum of the first antenna in the male of *C. madrasensis* is composed of 12 joints, whereas in the male of *C. panamense* Shoemaker it is composed of 17 joints. *C. rioplatense* Giambiagi is a nonborrowing form distinct from *C. madrasensis*.

My thanks are due to Dr. C. P. Gnanamuthu, director, University Zoology Laboratory, Madras, for guidance, and to Clarence R. Shoemaker, associate in zoology, United States National Museum, Washington, for having gone through the paper and offering several valuable suggestions and criticisms and for helping me obtain some of his reprints not available in India.

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ICHTHYOLOGY.—*The comparative food habits of the cyprinid fishes* Nocomis biguttatus *and* Nocomis micropogon *in western New York.*[1] ERNEST A. LACHNER, U. S. National Museum.

The comparative food habits of closely related Cyprinidae have received little study. The diet of our nongame fishes has generally been neglected, although it is an important factor in the maintenance of a large forage population. This study compares the food habits of the river chub, *Nocomis micropogon* (Cope), and the hornyhead chub, *Nocomis biguttatus* (Kirtland), during four months of late spring and summer. The type, quantity, and differences in food taken between these species in their various age groups and within the growing season are considered.

Cope (1869, p. 353) related the food of various species of cyprinids with the length of the alimentary canal. He listed the food of *Hypsilepis kentuckiensis* (*Nocomis biguttatus* or *N. micropogon*) as insects and crustaceans, along with other cyprinids, as *Exoglossum maxillingua* (LeSueur) and *Ericymba buccata* Cope, which have short alimentary canals, seven-ninths of standard length.

Forbes (1883, p. 76) placed *Nocomis biguttatus* in a group of Cyprinidae having short intestines and hooked pharyngeal teeth without grinding surfaces, and listed *Phenacobius, Semotilus, Ericymba, Rhinichthys,* and other genera with it. The food habits of 13 *Ceratichthys biguttatus* (*Nocomis* sp.), based upon an examination of the alimentary canals, are listed and compared with 14 other species of Cyprinidae (1883, p. 94). He found the diet to consist of one-fourth insects, "largely case-worms and other neuropterous larvae, another fourth being crustaceans (crawfishes), eaten, however, by only two of the specimens." The remainder of 54 percent (ratio in which the item was found) "was equally divided between algae and seeds of *Setaria* and other grass-like plants." He concludes: "The extraordinary amount of vegetation in the food of this fish is possibly related to the increased length of the alimentary canal," the measurements of which he gave as "the head and body being contained in the intestine about 1¼ times."

Evermann and Clark (1920, p. 363) record the diet of *Hybopsis kentuckiensis* (*Nocomis* sp.) to consist chiefly of worms, insect larvae, small crustaceans, and small fishes. Forbes and Richardson (1920, p. 169) have cited the same data as presented by Forbes (1883, p. 94). Although Breder and Crawford (1922) did not study the species concerned here, an interesting summary is presented on the food of related cyprinids. Greeley (1927, p. 60) found the fragments of 10 small clams (*Sphaerium?*) in *Nocomis biguttatus.* Hubbs and Cooper (1936, p. 50) list the larval stages of aquatic insects as the most important item of diet and smaller crustaceans, such as water-fleas, earthworms, and terrestrial insects, as probably eaten to some extent by *Nocomis biguttatus.* They cite that larger *biguttatus* eat some crayfish and that algae and other plants are taken but serve little value as food.

MATERIAL AND METHODS

The stomach contents of 607 specimens of *micropogon* and *biguttatus* were analyzed, 470 containing food. These specimens ranged in age from young of the year to 3-year-old adults and were collected in Sandy Creek, Lake Ontario drainage, Monroe County, N. Y. The dates of the collections, the number of specimens of the two species taken together, the number of stomachs examined in each age group, and the number containing food are given in Table 1.

Only the contents of the stomach were analyzed. These were removed and placed in a watch glass. The organisms were sorted, identified, and counted, and the volume of each was estimated. Only rarely were organisms found in the esophagus or mouth; these were included with the stomach contents. Although food was present in the intestinal tract while the stomach may have been empty, no attempt was made to identify this food other than for general information. Each specimen was aged by scale analysis which was recorded with the individual food description. The high correlation between age and size made it as reliable to compare the diet with age groups as with size groups, and was more convenient in tabulating the

[1] Received March 15, 1950.

TABLE 1.—DATA CONCERNING THE COLLECTIONS USED IN THE FOOD ANALYSIS OF TWO SPECIES OF NOCOMIS FROM SANDY CREEK, MONROE COUNTY, N. Y.

Date	Age in years	Number caught		Stomachs examined		Stomachs with food		Stomachs with food, in percent	
		1*	2*	1	2	1	2	1	2
July 19, 1939	0+	40	9	40	9	18	6	45.0	66.7
September 25, 1939	0+	30	118	38	118	31	94	81.5	79.5
June 10, 1940	1+	55	73	53	48	38	36	71.7	75.0
July 19 and August 5, 1939	1+	86	79	86	55	22	21	25.6	38.2
September 25, 1939	1+	58	41	58	41	43	28	74.2	68.3
July 19, August 5, and September 25, 1939 and June 10, 1940	2+ or older	24	40	24	37	9	24	37.5	64.9
Total	0+ to 2+	302	360	299	308	161	209	53.9	67.8

* Column 1 = *biguttatus;* Column 2 = *micropogon.*

data. A study of growth of the chubs will be published separately.

HABITAT DESCRIPTION

The area of Sandy Creek from which specimens were taken was approximately 1 to 10 miles above the mouth. The water is normally clear and white, with a normal flow of 50 to 100 cubic feet per second, and a slow to moderate current. The stream varies in width from 50 to 150 feet, through open grazing lands, partial willow growths, or heavier woodlands. The bottom composition is chiefly sandstone bedrock, and low gradient riffles of gravel and rubble are located about every 100 to 150 yards. Some pools are present up to 3 feet in depth, generally below the riffles. Water tempertures vary from 70° to 80° F. during the summer months. Probably the most characteristic feature of this stream is the dense growth, especially early in summer, of filamentous algae, chiefly *Cladophora*. It forms dense mats over the areas of quiet waters, and large strands are present in the riffles. Several species of *Potamogeton* are also present. The stream is smaller with less flow, and contains far more vegetation than is generally reported for a *micropogon* habitat (Hubbs, 1926, p. 29; Hubbs and Cooper, 1936, p. 26). Here *micropogon*, *biguttatus*, and *Notropis cornutus chrysocephalus* (Rafinesque) represent the most abundant species of fish fauna. All three were taken in about equal numbers by seining.

Throughout its range, it appears that *micropogon* is generally distributed in larger streams than is *biguttatus*. This is particularly true of their occurrence in the Allegheny River of western Pennsylvania. The young of *biguttatus* are commonly taken in algal and vascular-plant beds of more slowly flowing water, while the young of *micropogon* generally avoid such a habitat, appearing in the open and faster flowing water.

TYPE OF FOOD TAKEN

Eight orders of Insecta were represented in the diet of *biguttatus*, and ten orders in *micropogon*. Of the orders listed in Table 2, only the Homoptera, Lepidoptera, and Hymenoptera were terrestrial in origin. All other organisms were aquatic with the exception of several Carabidae among the Coleoptera. The following organisms were more specifically identified: The Neuroptera were represented by the family Sialidae, *Corydalis cornuta*, or dobson-fly larvae. Only one *Hexagenia* nymph (Ephemeridae) was found among the Ephemeroptera, all of the others being nonburrowing mayflies, mainly Baetidae. The Anisoptera, dragonflies, were the only Odonata found. The Plecoptera, stoneflies, were chiefly Perlidae. Of the Coleoptera, Hydrophilidae, Haliplidae (*Peltodytes cornuta*), Parnidae (*Psephenus*, the water penny), and a few ground beetles, Carabidae, were recorded. The caddis-worm, *Helicopsyche*, was the most numerous Trichoptera, and *Glossosoma*, *Molanna*, and *Brachycentrus* occurred in smaller numbers. Among the dipterous insects *Simulium*, black-fly larvae, and *Chironomus*, midge larvae, were abundantly found, with but a few other larvae such as *Limnophora* (Anthomyiidae). The dipterous pupae were mostly *Chironomus*.

In the invertebrates, other than insects, only a few water-mites, or hydrachnids, and

water spiders were taken. The Crustacea were chiefly Cladocera (water-fleas), Ostracoda, Amphipoda (scuds), Isopoda (sowbugs), and Decapoda (*Cambarus propinquus*, crayfish). The Mollusca were mainly gastropods. *Physa heterostropha* was most commonly identified. *Sphaerium* and *Ferrissa* were also determined. Only one earthworm, *Lumbricus*, was found. Among the animal remains were fish tissue and scales and other undeterminable tissue. The organisms of the stomachs were generally in such a dismembered condition that many were identified to orders only. The plant material was mainly a filamentous algae, *Cladophora*, but smal quantities of other filamentous types oc curred. Seeds, stems, and leaves of vascular plants were found, and of these, *Anacharis* (water-weed), *Vallisneria*, and *Potamogeton* (pond-weed) were determined.

TABLE 2.—SUMMARY OF FOOD OF TWO SPECIES OF NOCOMIS COLLECTED JULY 19, AUGUST 5, SEPTEMBER 25, 1939, AND JUNE 10, 1940, FROM SANDY CREEK, N. Y.*

	biguttatus				*micropogon*			
Stomachs examined	299				308			
Stomachs with food	161				209			
ITEM	A†	B	C	D	A	B	C	D
Insecta	—	—	—	59.7	—	—	—	70.6
Neuroptera	—	—	—	—	2	1.0	1.0	0.2
Ephemeroptera	13	1.2	8.1	4.5	34	2.1	16.2	6.1
Odonata	1	1.0	0.6	0.4	—	—	—	—
Plecoptera	1	1.0	0.6	†	6	1.8	2.9	0.3
Hemiptera	5	1.2	3.1	0.5	5	1.4	2.4	1.2
Homoptera	—	—	—	—	1	1.0	0.5	‡
Coleoptera	—	—	—	2.3	—	—	—	4.4
Larvae	6	1.3	3.7	1.2	7	1.0	3.4	2.4
Adults	3	1.0	1.9	1.1	10	1.1	4.8	2.0
Trichoptera	—	—	—	32.4	—	—	—	26.3
Helicopsyche	51	11.0	31.7	25.5	39	6.2	18.6	17.2
Other Trichoptera	20	2.2	12.4	6.9	33	1.3	15.8	9.1
Lepidoptera	—	—	—	—	1	1.0	0.5	‡
Diptera	—	—	—	14.4	—	—	—	25.2
Chironomus larvae	41	9.4	25.4	10.0	42	5.0	20.1	7.6
Simulium larvae	8	4.5	5.0	2.2	36	13.4	17.2	10.0
Other larvae	5	1.8	3.1	1.9	7	1.4	3.4	6.2
Pupae	3	2.0	1.9	†	12	1.8	5.7	0.8
Adults	4	1.0	2.5	0.3	7	1.0	3.4	0.6
Hymenoptera	1	1.0	0.6	†	2	1.0	1.0	0.6
Insecta remains	35	—	21.8	5.2	52	—	24.8	6.3
Arachnida	1	1.0	0.6	‡	4	1.3	1.9	0.5
Crustacea	—	—	—	12.7	—	—	—	4.9
Cladocera	3	21.7	1.9	1.0	—	—	—	—
Ostracoda	14	9.2	8.7	4.0	2	6.5	1.0	0.5
Isopoda	1	1.0	0.6	‡	—	—	—	—
Amphipoda	2	1.0	1.2	1.1	—	—	—	—
Decapoda (*Cambarus*)	17	1.0	1.1	6.5	14	1.0	6.7	4.4
Crustacea remains	2	—	1.2	0.1	—	—	—	—
Mollusca	—	—	—	6.7	—	—	—	4.2
Gastropoda	18	1.4	1.1	4.5	11	1.8	5.3	3.9
Pelecypoda	6	1.7	3.7	2.2	2	2.0	1.0	0.3
Annelida	1	1.0	2.6	2.4	—	—	—	—
Animal remains	6	—	3.7	1.1	7	—	3.4	0.6
Plants	—	—	—	19.9	—	—	—	19.8
Filamentous algae	36	—	22.4	15.4	77	—	36.8	18.7
Vascular remains	14	—	8.7	4.5	24	—	11.5	1.1

* Specimens ranged in age from young of year to three-year old adults.

† A = Number of stomachs containing item; B = average number of items per stomach; C = percentage of stomachs containing item; D = percentage of volume of all food.

‡ = trace, less than 0.05.

COMPARATIVE FOOD HABITS

Food of young.—The food for early summer was determined by analysis of 40 specimens of young *biguttatus* taken on July 19, 1939, 18 containing food. Ostracods were present in 66.7 percent of the stomachs and formed 36.1 percent of the total volume of food. Three stomachs contained only ostracods and 35 were counted in one. Ephemeroptera nymphs, *Chironomus* larvae, and Cladocera each formed about 10 percent of the volume of all food. One stomach contained no other food except 25 Cladocera. Three stomachs contained algae, forming 13.8 percent of the volume. Six stomachs of 9 *micropogon* specimens taken had food, and the data are compared with *biguttatus* in Table 3.

The food of young *biguttatus* is compared with that of *micropogon* for late summer in Table 3, based on a collection made on September 25, 1939, in which 38 *biguttatus* were caught, 81.5 percent with food, and 118 *micropogon*, 79.5 percent with food. The mean standard length of the specimens of *micropogon* was 4.4 mm greater than that of *biguttatus*. The insect diet of *biguttatus* formed 89.0 percent of the total volume; that of *micropogon*, 83.2 percent. The main items of diet for *biguttatus* were a caddis-fly larva, *Helicopsyche*, 74.3 percent (column

TABLE 3.—FOOD OF THE YOUNG OF TWO SPECIES OF NOCOMIS FROM SANDY CREEK, N. Y.*

Date	July 19, 1939								September 25, 1939							
Species	*biguttatus*				*micropogon*				*biguttatus*				*micropogon*			
Mean S.L.† in mm.	33.1				34.5				55.6				60.0			
Range of S.L. in mm.	27–37				30–38				36–67				43–74			
Stomachs examined	40				9				38				118			
Stomachs with food	18				6				31				94			
Stomachs with food (%)	45.0				66.7				81.5				79.5			
ITEM	A	B	C	D‡	A	B	C	D	A	B	C	D	A	B	C	D
Insecta	—	—	—	31.4	—	—	—	83.3	—	—	—	89.0	—	—	—	83.2
Ephemeroptera	3	1.0	16.7	8.6	2	4.5	33.3	31.6	2	1.0	6.5	1.9	22	2.2	23.4	9.4
Plecoptera	—	—	—	—	—	—	—	—	—	—	—	—	5	2.0	5.3	0.5
Hemiptera	—	—	—	—	—	—	—	—	—	—	—	—	2	1.5	2.1	0.2
Coleoptera	—	—	—	—	—	—	—	—	—	—	—	1.9	—	—	—	4.7
Larvae	—	—	—	—	—	—	—	—	1	1.0	3.2	1.9	4	1.0	4.3	3.8
Adults	—	—	—	—	—	—	—	—	—	—	—	—	3	1.0	3.2	0.9
Trichoptera	1	1.0	5.5	5.9	3	1.0	50.0	35.0	—	—	—	6.1	—	—	—	33.7
Helicopsyche	—	—	—	—	—	—	—	—	23	8.8	74.3	58.9	352	6.3	37.3	26.9
Other Trichoptera	—	—	—	—	—	—	—	—	4	2.3	12.9	4.2	10	1.0	10.6	6.8
Lepidoptera	—	—	—	—	—	—	—	—	—	—	—	—	1	1.0	1.1	‡
Diptera	—	—	—	10.7	—	—	—	—	—	—	—	18.0	—	—	—	23.3
Chironomus larvae	4	3.0	22.2	10.7	—	—	—	—	9	7.5	29.0	11.7	22	5.1	23.4	6.5
Simulium larvae	—	—	—	—	—	—	—	—	4	2.5	12.9	6.1	23	13.4	24.5	14.3
Other larvae	—	—	—	—	—	—	—	—	—	—	—	—	3	2.0	3.2	0.9
Pupae	—	—	—	—	—	—	—	—	1	3.0	3.2	0.2	9	1.9	9.6	1.5
Adults	—	—	—	—	—	—	—	—	—	—	—	—	2	1.0	2.1	0.1
Insecta remains	4	—	22.2	6.2	1	—	16.7	16.7	10	—	32.2	6.1	35	—	37.2	11.4
Arachnida	—	—	—	—	—	—	—	—	—	—	—	—	2	1.5	2.1	‡
Crustacea	—	—	—	45.0	—	—	—	16.7	—	—	—	1.3	—	—	—	‡
Cladocera	3	21.7	16.7	8.6	—	—	—	—	—	—	—	—	—	—	—	—
Ostracoda	12	10.4	66.7	36.1	1	12.0	16.7	16.7	—	—	—	—	1	1.0	1.1	‡
Decapoda (*Cambarus*)	—	—	—	—	—	—	—	—	1	1.0	3.2	1.3	—	—	—	—
Crustacea remains	1	—	5.5	0.3	—	—	—	—	—	—	—	—	—	—	—	—
Mollusca	—	—	—	13.8	—	—	—	—	—	—	—	6.9	—	—	—	5.6
Gastropoda	4	1.0	22.2	13.8	—	—	—	—	6	1.3	19.4	5.6	4	2.3	4.3	4.8
Pelecypoda	—	—	—	—	—	—	—	—	1	1.0	3.2	1.3	2	2.0	2.1	0.8
Plants	—	—	—	9.8	—	—	—	—	—	—	—	2.8	—	—	—	11.0
Filamentous algae	3	—	16.7	9.8	—	—	—	—	6	—	19.4	2.8	29	—	30.1	10.5
Vascular remains	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1.1	0.5

* For explanation of A, B, C, and D, see footnote to Table 2.
† S.L. = standard length.
‡ See footnote to Table 2.

TABLE 4.—FOOD OF THE JUVENILES (SECOND SUMMER) OF TWO SPECIES OF NOCOMIS FROM SANDY CREEK, N. Y.

Date	June 10, 1940								July 19 and August 5, 1939								September 25, 1939							
Species	*bigguttatus*				*micropogon*				*bigguttatus*				*micropogon*				*bigguttatus*				*micropogon*			
Mean S.L. in mm.	53.5				73.9				86.7				92.0				87.2				98.1			
Range of S.L. in mm.	38–76				55–91				65–106				79–110				69–109				82–133			
Stomachs examined	53				48				86				55				58				41			
Stomachs with food	38				36				22				21				43				28			
Stomachs with food (%)	71.7				75.0				25.6				38.2				74.2				68.3			
ITEM	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Insecta	—	—	—	71.9	—	—	—	53.2	—	—	—	63.1	—	—	—	65.4	—	—	—	47.9	—	—	—	26.3
Ephemeroptera	4	1.8	10.5	4.6	6	1.5	16.7	2.5	4	1.0	18.2	15.1	2	2.0	9.5	3.9	—	—	—	—	1	1.0	3.6	1.1
Odonata	1	1.0	2.6	1.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Plecoptera	—	—	—	—	1	1.0	2.7	0.4	—	—	—	—	—	—	—	—	1	1.0	2.3	†	—	—	—	—
Hemiptera	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	1.2	11.6	2.0	2	1.5	7.2	2.9
Coleoptera	—	—	—	4.7	—	—	—	2.4	—	—	—	0.3	—	—	—	4.8	—	—	—	0.7	—	—	—	—
Larvae	1	1.0	2.6	0.4	1	1.0	2.7	1.0	—	—	—	—	—	—	—	—	2	1.5	4.7	0.7	—	—	—	—
Adults	2	1.0	5.3	4.3	2	1.5	5.6	1.4	1	1.0	4.6	0.3	1	1.0	4.8	4.8	—	—	—	—	—	—	—	—
Trichoptera	—	—	—	8.2	—	—	—	6.3	—	—	—	47.3	—	—	—	40.7	—	—	—	42.8	—	—	—	4.3
Helicopsyche	—	—	—	—	1	1.0	2.7	0.8	7	3.9	31.8	27.2	2	2.0	9.5	9.3	20	16.2	46.6	40.1	—	—	—	—
Other Trichoptera	6	2.2	15.8	8.2	5	1.2	13.9	5.5	5	2.2	22.7	20.1	8	2.6	38.1	31.4	3	1.0	7.0	2.7	5	1.4	17.9	4.3
Diptera	—	—	—	38.5	—	—	—	32.1	—	—	—	0.2	—	—	—	7.8	—	—	—	1.1	—	—	—	12.0
Chironomus larvae	21	13.6	55.2	25.4	12	7.1	33.3	11.4	2	1.5	9.1	0.2	2	2.5	9.5	1.9	5	3.6	11.6	0.4	5	1.4	17.9	6.3
Simulium larvae	3	8.3	7.9	4.3	11	13.9	30.6	18.2	—	—	—	—	2	11.0	9.5	4.5	1	1.0	2.3	0.2	—	—	—	
Other larvae	4	2.0	10.5	8.0	1	1.0	2.7	1.1	1	1.0	4.6	†	—	—	—	—	—	—	—	—	2	1.0	7.2	3.6
Pupae	1	1.0	2.6	†	3	1.7	8.3	0.7	—	—	—	—	—	—	—	—	1	2.0	2.3	†	—	—	—	—
Adults	2	1.0	5.3	0.8	2	1.0	5.6	0.7	—	—	—	—	1	1.0	4.8	1.4	2	1.0	4.7	0.5	2	1.0	7.2	2.1
Hymenoptera	—	—	—	—	1	1.0	2.7	0.7	—	—	—	—	—	—	—	—	1	1.0	2.3	0.2	1	1.0	3.6	3.6
Insect remains	15	—	39.4	14.1	10	—	27.8	8.8	1	—	4.5	0.2	2	—	9.5	8.2	5	—	11.6	1.1	4	—	14.3	2.6
Arachnida	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1.0	2.3	†	2	1.0	7.2	3.6
Crustacea	—	—	—	9.9	—	—	—	5.3	—	—	—	22.4	—	—	—	14.3	—	—	—	11.3	—	—	—	3.5
Ostracoda	2	1.5	5.3	†	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Isopoda	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1.0	2.3	†	—	—	—	—
Amphipoda	2	1.0	5.3	5.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Decapoda (*Cambarus*)	2	1.0	5.3	4.7	3	1.0	8.3	5.3	6	1.0	27.2	22.0	3	1.0	14.3	14.3	5	1.0	11.6	11.3	1	1.0	3.6	3.5
Crustacea remains	—	—	—	—	—	—	—	—	1	—	4.6	0.4	—	—	—	—	—	—	—	—	—	—	—	—
Mollusca	—	—	—	2.4	—	—	—	—	—	—	—	9.6	—	—	—	0.6	—	—	—	7.5	—	—	—	3.9
Gastropoda	—	—	—	—	—	—	—	—	3	1.0	13.6	9.4	1	1.0	4.8	0.6	5	2.2	11.6	2.3	2	1.0	7.2	3.9
Pelecypoda	1	1.0	2.6	2.4	—	—	—	—	1	2.0	4.6	0.2	—	—	—	—	3	2.0	7.0	5.2	—	—	—	—
Annelida	1	1.0	2.6	2.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Animal remains	3	—	7.9	5.3	—	—	—	—	1	—	4.6	0.2	—	—	—	—	2	—	4.7	†	6	—	21.4	5.8
Plants	—	—	—	8.5	—	—	—	41.2	—	—	—	4.6	—	—	—	19.4	—	—	—	33.3	—	—	—	56.8
Filamentous algae	3	—	7.9	0.3	10	—	27.8	12.2	4	—	18.2	4.6	6	—	28.6	19.4	19	—	44.2	29.1	21	—	75.0	56.8
Vascular remains	6	—	15.8	8.2	17	—	47.2	29.0	—	—	—	—	—	—	—	—	4	—	9.3	4.2	—	—	—	—

C, percentage of stomachs containing the item, Table 3); midge larvae, *Chironomus*, 29.0; black-fly larvae, *Simulium*, 12.9; mayflies, Ephemeroptera, 6.5; snails, Gastropoda, 19.4; and filamentous algae, 19.4. Comparable data for *micropogon* were *Helicopsyche*, 37.3; *Chironomus*, 23.4; *Simulium*, 24.5; Ephemeroptera, 23.4; Gastropoda, 4.3; and filamentous algae, 30.1. Considering the other items listed, Table 3, one can only note minor differences in the food habits of the young collected in September. It is interesting that *micropogon* had eaten considerably more algae (see D, Table 3) than

had *biguttatus*, probably not to be expected if one considered the habitat preferences of the two species.

In September ten stomachs of young *micropogon* contained only *Helicopsyche*, of which 37 larvae and the snaillike cases appeared in a single stomach; this type averaged 6.3 per stomach when present. *Simulium* and *Chironomus* also frequently formed a single item of diet for an individual *micropogon* or *biguttatus*; 96 of the former were counted in one *micropogon* stomach and 36 of the latter in a single stomach of *biguttatus*. Six *micropogon* stomachs contained algae exclusively.

Food of juveniles, in second summer's growth; for late spring.—The food of juvenile *Nocomis* for late spring was based on the analysis of 53 *biguttatus*, 71.7 percent with food, and 48 *micropogon*, 75 percent containing food, collected June 10, 1940. The data are summarized in Table 4. The mean standard length of the *micropogon* sample exceeded that of *biguttatus* by 20.4 mm. The insect diet of *biguttatus* represented 71.9 percent of the total volume of all food taken, compared to 53.2 in *micropogon*. The common items of food for both species were Ephemeroptera, 10.5, 16.7 (percentage of stomachs containing item in *biguttatus* and *micropogon* respectively); Trichoptera larvae, 15.8, 16.6; *Chironomus* larvae, 55.2, 33.4; *Simulium* larvae, 7.9, 30.6; and *Cambarus*, 5.3, 8.3.

A similar difference occurs with the plant material taken, as mentioned above for the young during September. In *biguttatus* only small amounts of filamentous algae were found, 7.9 percent of the stomachs containing algae, forming 0.3 percent of total volume of all food, compared to 27.8 and 12.2 percent for *micropogon*. The vascular plant remains showed the same trend: in *biguttatus*, 15.8, 8.2; *micropogon*, 47.2, 29.0.

Chironomids were taken in considerable numbers by *biguttatus*, 286 appearing in 21 stomachs, averaging 13.6 per stomach. As many as 78 were counted in a single specimen. Other comparative data concerning food items eaten are presented in Table 4.

Food of juveniles in midsummer.—Food studies of juvenile *Nocomis* for midsummer were based on 86 *biguttatus*, 25.6 percent with food and 55 *micropogon*, 38.2 percent containing food, collected July 19 and August 5, 1939. The data are summarized in Table 4. The high percentage of empty stomach is of interest and may be related to the observed "schooling" habits of both species during midsummer in Sandy Creek. The specimens of these two collections were taken only in several seining hauls through the pools, up to 3 feet in depth, below low gradient riffles. The chubs were easily observed for the school was compact. This habit is somewhat contrary to the general reports of others and was not observed during June and September in Sandy Creek. In June they are generally distributed in riffles, shallow pools and also about the heavy algal growth of the more slowly flowing water. They usually caught in small numbers, four or five appearing in a good seine haul. In September their habits are more secretive and solitary, especially the larger adults. One or two may be taken from under a slab rock, and numbers are caught only by much seining.

There was little difference in the insect diet of the two species. In *biguttatus* it was 63.1 percent of the total volume; and in *micropogon*, 65.4. Ephemeroptera nymphs and *Helicopsyche* and other trichopterous larvae were the common forms. A notable reduction of *Chironomus* and *Simulium* as food items was noted, their sum being 0.2 in *biguttatus* and 6.4 in *micropogon*, in percent of volume of all food. Many more crayfish, *Cambarus*, appeared than in the younger specimens of June. In *biguttatus*, crayfish were found in 27.2 percent of the stomachs totaling 22 percent of the food by volume, and in *micropogon* similar figures were 14.3 and 14.3 percent. Filamentous algae were again consumed in greater amounts by *micropogon*. It was present in 18.2 percent of the stomachs of *biguttatus* and 28.6 in *micropogon*, forming 4.6 percent of the food volume in the former and 19.4 in the latter. Those stomachs with food contained smaller amounts, and the average number of items per stomach (Table 4, column B) was lower.

Food of juveniles late in summer.—A summary of the food of juvenile *Nocomis* for late summer is also presented in Table 4. A reduction of insect food was noted in both

species, insects constituting 47.9 percent of food volume in *biguttatus* and 26.3 percent in *micropogon*. Greater amounts of filamentous algae were taken, such algae appearing in 44.2 percent of stomachs in *biguttatus* (29.1 percent of volume), and in 75 percent of stomachs of *micropogon* (56.8 percent of volume). *N. biguttatus* had eaten many *Helicopsyche*, this food item appearing in 46.6 percent of stomachs, and representing 40.1 percent of the volume of all food. Twenty stomachs averaged 16.2 of these caddisfly larvae, and as many as 68 were counted in one individual. No *Helicopsyche* were included in the diet of *micropogon*.

Food of adults, two years old or more.—The summer food of the larger and older specimens is presented in Table 5. The classification "adult" is for convenience in terminology. Some of the "juveniles" of September (Table 4) were mature fish. Chubs more than 2 years old formed but a small part of the total population sampled, representing 8 percent of 302 *biguttatus* and 11 percent of 360 *micropogon* specimens. Fewer insects were eaten by this group. *N. biguttatus* had 12.2 percent of the volume of all food composed of insects and *micropogon* 32.5 percent. No order of insects predominated. *Cambarus* was more commonly eaten appearing in 33.3 percent of the stomachs of *biguttatus* and 29.2 percent in *micropogon*. Plant material composed a large part of the volume of all food, forming 55.6 percent in *biguttatus* and 44.1 in *micropogon*.

The vegetable matter ranked second only to insects in volume of all food taken for all age groups. It was probably taken secondarily, through the acquisition of animal food. The intestinal tract usually contained undigested filamentous algae. The raptorial dentition of both species does not suggest a vegetable diet, nor does the short length of the intestines, which is probably similar in both species (for five adults, length of distended intestine into standard length: *biguttatus*, range 1.2–1.4, average 1.3; *micropogon*, range 1.0–1.4, average 1.2).

TABLE 5.—FOOD OF THE ADULTS (2 YEARS OLD OR MORE) OF TWO SPECIES OF NOCOMIS COLLECTED JULY 19, AUGUST 5, SEPTEMBER 25, 1939, AND JUNE 10, 1940, FROM SANDY CREEK, N. Y.

	biguttatus				*micropogon*			
Mean S.L. in mm	99.8				122.6			
Range of S.L. in mm	88–118				93–150			
Stomachs examined	24				37			
Stomachs with food	9				24			
Stomachs with food (per cent)	37.5				64.9			
ITEM	A	B	C	D	A	B	C	D
Insecta	—	—	—	12.2	—	—	—	32.5
Neuroptera	—	—	—	—	2	1.0	8.3	4.6
Ephemeroptera	—	—	—	—	1	1.0	4.2	0.2
Hemiptera	—	—	—	—	1	1.0	4.2	4.2
Homoptera	—	—	—	—	1	1.0	4.2	0.2
Coleoptera	—	—	—	8.9	—	—	—	11.9
Larvae	1	2.0	11.1	8.9	2	1.0	8.3	4.3
Adults	—	—	—	—	4	1.0	16.7	7.6
Trichoptera	—	—	—	3.3	—	—	—	7.1
Helicopsyche	1	10.0	11.1	2.2	1	17.0	4.2	4.0
Other Trichoptera	1	6.0	11.1	1.1	2	2.5	8.3	3.1
Diptera	—	—	—	—	—	—	—	4.3
Chironomus larvae	—	—	—	—	1	2.0	4.2	0.1
Other larvae	—	—	—	—	1	1.0	4.2	4.2
Crustacea								
Decapoda (*Cambarus*)	3	1.0	33.3	32.2	7	1.0	19.2	13.5
Mollusca								
Gastropoda	—	—	—	—	4	2.0	16.7	9.4
Animal remains	—	—	—	—		—	4.2	0.8
Plants	—	—	—	55.6	—	—	—	44.1
Filamentous algae	1	—	11.1	11.1	11	—	45.8	33.8
Vascular remains	4	—	44.5	44.5	6	—	25.0	10.3

This is in agreement with Breder and Crawford (1922) and contrary to Forbes (1883 p. 89). A general summary of the numbers of individual food items consumed for all age groups of both species is presented in Table 2.

SUMMARY

1. The study of food habits was based on stomach examination of 607 specimens (470 with food) of *Nocomis micropogon* and *N. biguttatus*, that ranged in age from young to 3-year-old adults, and ranged in size from 27 to 150 mm in standard length.

2. Practically all the animal food for both species was composed of aquatic Insecta, Crustacea, and Mollusca.

3. The types of food taken by the two species were very similar. The organisms most frequently encountered in the stomachs were *Simulium*, *Chironomus*, *Helicopsyche*, various Ephemeroptera, and *Cambarus*. Ostracoda and Cladocera were eaten in appreciable numbers only by the young of the year during July.

4. Only minor differences existed in the comparative amounts of animal food taken by each species.

5. Filamentous algae, chiefly *Cladophora*, and vascular plants were taken in large quantities. It is probable that much of the plant material was taken with the animal food.

6. Almost all food was benthotic, other than the Ostracoda and Cladocera food of the young.

7. More stomachs were found empty during the midsummer months of July and August compared to those collected in June and September. Stomachs containing food at midsummer had less food by numbers or volume, compared with stomachs examined for June or September. This reduced feeding may be related to a schooling habit which was observed; perhaps food was not available to all *Nocomis* in the compact school.

8. Aquatic insects provided most of the food for the young and smaller juveniles of both species. Crayfish were eaten in greatest quantities by the larger and older juvenile and adult chubs. Plant material, chiefly filamentous algae, formed almost one-half of the volume of the stomach contents of the older juveniles and adults.

This study represented a part of the thesis requirements for the degree of doctor of philosophy, Cornell University. The writer is indebted to Dr. Edward C. Raney, Cornell University, for aid and useful suggestions in the preparation of this work.

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ORNITHOLOGY.—*The northern races of Dendrocolaptes certhia*.[1] W. E. CLYDE TODD, Carnegie Museum, Pittsburgh. (Communicated by H. G. Deignan.)

The woodhewer *Dendrocolaptes certhia* (Boddaert) has a wide distribution in tropical America, from Brazil and Bolivia north through Central America to southeastern Mexico. It is a plastic species and divides up into a number of well-marked geographical races. The South American forms were treated by Hellmayr (Publ. Field Mus. Nat. Hist., zool. ser., **13**(4): 259–264. 1925), and later by Zimmer. (Amer. Mus. Nov. no. 753: 1–4. 1934), but so far as I am aware no recent taxonomic work has been done on the northern races, which seem to be in need of further revision. Four forms can be recog-

[1] Received May 8, 1950.

nized with the material at hand, all of which is in the Carnegie Museum Collection.

Dendrocolaptes certhia sancti-thomae
(Lafresnaye)

Dendrocops sancti-thomae Lafresnaye, Rev. et Mag. Zool. (2) **4**: 466. 1852 ("in insula Sancti-Thomae" [error];—Santo Tomás, Guatemala).

Ten specimens: Manatee Lagoon, Quamin Creek, Toledo District, El Cayo, Cockscomb Mountains, and Freetown, British Honduras; La Ceiba, Honduras.

Measurements.—Five males: Wing, 120–127 (average, 123); tail, 107–113 (110); exposed culmen, 36–38 (37) mm.

Range.—From Veracruz and Campeche south through Guatemala, British Honduras, and Honduras (to Nicaragua?).

Remarks.—In this race the pileum is more decidedly rufescent, and thus more strongly contrasted with the rest of the underparts, than in Costa Rican and Colombian birds. The type locality was erroneously given as the island of St. Thomas, in the Lesser Antilles, but is actually Santo Tomás, "Honduras" (now across the line in Guatemala), as pointed out by Salvin and Godman (Biol. Centr.-Amer., Aves, **2**: 192, 1892). Inasmuch as our single specimen from La Ceiba is like British Honduras birds, all may safely be regarded as being typical of this race. I have not seen any specimens from Mexico or Nicaragua. There is little difference in general size between Costa Rican and British Honduras examples, but in the latter the bill is more extensively pale at the base below. This and the more rufescent pileum are good racial characters.

Dendrocolaptes certhia nigrirostris, subsp. nov.

Fourteen specimens: Guapiles, Guacimo, Cuabre, El Hogar, Bebedero, and Miravalles, Costa Rica.

Type.—Carnegie Mus. no. 26812, adult male; El Hogar, Costa Rica, December 30, 1905; M. A. Carriker, Jr.

Subspecific characters.—Similar to *Dendrocolaptes certhia sancti-thomae* (Lafresnaye) of southeastern Mexico, Guatemala, and Honduras, but general tone of coloration darker (more brownish), and bill shorter, and black or nearly so, with the pale area in the mandible much reduced or wanting.

Measurements.—Nine males: wing, 119–134 (average, 129); tail, 111–121 (117.5); exposed culmen, 35–40 (33) mm.

Remarks.—The shorter and differently colored bill is the best character of this race. In our series of 14 specimens the bill is given as "black" by the collector, or "black with pale edge." Comparison in series brings out the slightly darker coloration also, although some individual specimens would be indistinguishable on this score. The size is about the same. Fall and winter birds average slightly paler than summer breeding specimens. A single immature bird (no. 27306, June 18) is indistinguishable from adults except by its slightly shorter bill and less distinctly barred lower abdomen and under tail coverts.

Dendrocolaptes certhia hesperius Bangs

Dendrocolaptes sancti-thomae hesperius Bangs, Auk **24**: 299. 1907 (Lagarto, Costa Rica).

Two specimens: El Pozo de Terraba, Costa Rica.

These bear out the main character ascribed to this form: the narrower barring of the underparts. Its known range is confined, however, to the Terraba Valley in southwestern Costa Rica, since birds from the other parts of the country are appreciably different. In their generally duller coloration and dark-colored bills our two birds resemble Colombian specimens but differ therefrom in their narrow barring below. This race probably ranges into western Panama.

Dendrocolaptes certhia colombianus, subsp. nov.

Fourteen specimens: Jaraquiel, El Tambor, Murindo, Quibdó, Andagoya, Potedo, and Malagita, Colombia.

Type.—Collection Carnegie Mus. no. 624293, adult male; Murindo, Colombia, February 16, 1918; M. A. Carriker, Jr.

Subspecific characters.—Similar to *Dendrocolaptes certhia nigrirostris* mihi of Costa Rica, etc., but general coloration of pileum and underparts more buffy, less rufescent, and bill longer and paler (more brownish) at base below.

Measurements.—Ten males: Wing, 125–134 (average, 129); tail, 108–127 (115); exposed culmen, 36.5–42 (38.5) mm.

Range.—Northern and western Colombia, west of the Magdalena Valley, and south to Ecuador.

Remarks.—As a series these average a little paler below than Costa Rican birds; the ground color is buffy rather than rufescent. The pileum

also is noticeably buffier. The mandible is marked by the collector as "pale horn-color at base", but it is not so extensively pale as in typical *sancti-thomae*. The color characters, in connection with the relatively longer bill, serve to make this an easily recognizable race when compared with *nigrirostris*.

The El Tambor specimen, however, from the interior of Colombia, may represent another race of this species.

HERPETOLOGY.—*A new subspecies of toad from Santa Catharina, Brazil.*[1] DORIS M. COCHRAN, U. S. National Museum.

During a study of the giant toads of Brazil, I compared a series of 91 *Bufo ictericus* Spix from Rio de Janeiro and São Paulo with 75 somewhat similar toads from Santa Catharina and found the latter deserving of subspecific recognition. I take pleasure in naming the new form after Dr. Robert Mertens, whose interest in the amphibians of southern Brazil is of long standing.

Bufo ictericus mertensi, n. subsp.

Diagnosis of Bufo ictericus mertensi.—Resembles *Bufo ictericus* Spix in general structure and color. Differs in having a longer femur and tibia and a narrower head than the true *ictericus*.

Description of the type.—An adult male, U.S.N.M. no. 105244 from Nova Teutonia, Itá, Santa Catharina, collected in 1938 by Fritz Plaumann. Tongue broadly elliptical, nearly one-half as wide as mouth opening, entire and free for its posterior half; snout short, rounded when seen from above and in profile, the upper jaw not extending beyond the lower; nostrils twice as far from eye as from tip of snout, well below the canthus, their openings superolateral, separated from each other by an interval equal to their distance from eye. Canthus rostralis with a heavy crest, which forks in front of eye, the main crest continuing above eye and forking again to form a short medial parietal crest, and a heavy postorbital crest which connects with the parotoid by a very short bridge; interorbital space concave; parotoid glands large and heavy, obovate, their inner borders slightly concave, their posterior borders on a level with the axillae. Eye moderate, scarcely projecting beyond the surrounding ridges, its diameter a little less than its distance from end of snout; interorbital diameter twice the width of upper eyelid, and twice the distance between nostrils. Tympanum very distinct, higher than broad, its height equal to three-fifths the diameter of eye, separated from eye by less than one-half its own height. Fingers free, with distinct lateral ridges, first finger longer than second and fourth; palmar tubercles prominent; subarticular tubercles of fingers single except for distal ones of third finger, which are double; toes nearly one-half webbed, fringed laterally to the tips, third much longer than fifth and reaching to base of penultimate phalanx of fourth; a small oval inner and a round outer metatarsal tubercle; subarticular tubercles of toes reduced to small spinules almost indistinguishable from those covering the tarsus; a distinct tarsal ridge marked by small tubercles. Body not especially stout, in postaxillary region nearly equal to greatest width of head; when hind leg is adpressed, heel reaches to front of shoulder; when limbs are laid along the sides, knee and elbow touch; when hind legs are bent at right angles to the body, heels fail to meet. Dorsum covered with large and small warts, all of them closely set with small dark spinules (in the male). Scapular ridges very heavy. No large tibial gland. No skin fold on chest. Venter coarsely granular, the throat and chest with small spiny tubercles mixed with the granules.

Color of adult male.—Back olive, with the numerous large warts set off by minute seal-brown spinules; top of crests and parotoid glands russet to clay color. Lower parts buff, the belly and sides with a coarse olive network; a few buff spots on outer sides of parotoid glands. Upper lip with a pale buff area from tip of snout to below eye, the labial crests with many small brown spinules. Palms and soles pale olive; the tips of fingers and toes, as well as the palmar and metatarsal tubercles, dark brown.

The females and young are much more brightly marked with a wide buff middorsal stripe, on each side of which is a row of dark brown spots, the anterior extending onto the eyelids. In older females the brown spots often fuse to a pair of sinuous brown stripes bordering the yellowish

[1] Received May 8, 1950.

middorsal one. The olive or brown ventral reticulations are more extensive in some specimens, reaching as far forward as the chest. A semicircle of buff on the side of the chest marks the insertion of the arm.

Measurements of the type.—Total length, 102 mm; head length (to posterior border of tympanum), 30.5 mm; head width, 42 mm; femur, 41 mm; tibia, 45 mm; foot (from proximal base of inner metatarsal tubercle), 41.5 mm; hand, 28 mm.

CRITICAL MEASUREMENTS IN PERCENTAGE OF TOTAL LENGTH

	Head length	Head width	Femur	Tibia	Foot	Hand
In the type	29.8	41.2	40.2	44.1	40.7	27.4
In the entire series of 75 specimens:						
Mean	28.9	39.9	41.6	39.2	40.2	25.5
σ	1.77	1.55	2.74	1.87	2.53	1.52
Varintion	6.1	3.9	6.6	4.8	6.3	6.0
σ_M	.205	.179	.317	.217	.295	.177
Range	24.0–33.4	35.5–44.0	35.9–48.2	34.8–44.1	33.4–46.0	20.3–29.5

Significant differences in twice the Standard Error of the Mean above and below the Mean are found in three of the critical measurements of *mertensi* as compared to the true *ictericus* from Rio de Janeiro and São Paulo. The head width is greater in *ictericus*, while the length of femur and tibia are greater in *mertensi*.

When a typical specimen of *ictericus* (U.S.N.M. no. 97740 from Nova Friburgo, Rio de Janeiro) is compared with the type of *mertensi*, the following differences are apparent:

Character	*ictericus*	*mertensi*
Tongue	Oval, one-third width of mouth.	Broadly elliptical, nearly one-half.
Nostrils	A little nearer to snout tip than to eye.	Twice as far from eye as from snout tip.
Interval between nostrils	Greater than their distance from eye.	Equal to that distance.
Eye diameter	Greater than its distance from snout tip.	A little less.
Tympanum/eye diameter	One-half	Three-fifths
Subarticular tubercles of fingers	Double (basal) or semidivided (distal).	Single (basal) distal of third double.
Toes webbed	One-third.	Nearly one-half.
Tarsal ridge	Faint, short.	Distinct, marked by tubercles.
Subarticular tubercles of toes	Small, double.	Reduced to small spinules.
Width of body in postaxillary region	1¼ times head width.	Nearly equal.
Knee and elbow	Fail to meet.	Touch.
Heels	Touch.	Fail to meet.
Scapular ridges	Very indistinct.	Very heavy.
Skinfold on chest	Slight.	Absent.

As many of these differences tend to merge when large series of both forms are compared, the diagnosis of *mertensi* is based on essential differences in critical measurements.

Paratypes.—U.S.N.M. nos. 103842–103906 and 105245–105251, with the same data as the type; U.S.N.M. nos. 98777–98778 from São Bento, Santa Catharina, collected by Bruno Behr in 1935.

PROCEEDINGS OF THE ACADEMY

438TH MEETING OF BOARD OF MANAGERS

The 438th meeting of the Board of Managers, held in the Cosmos Club on May 15, 1950, was called to order by President F. B. SILSBEE at 8:08 p.m. Also present were: H. S. RAPPLEYE, J. A. STEVENSON, H. A. REHDER, F. C. KRACEK, W. N. FENTON, C. L. GAZIN, W. R. WEDEL, W. A. DAYTON, E. W. PRICE, H. W. HEMPLE, H. G. DORSEY, O. B. FRENCH, F. M. SETZLER, and, by invitation, R. G. GATES and J. L. SHERESHEFSKY.

The President appointed J. A. STEVENSON to serve as the Academy's official delegate to the Seventh International Botanical Congress at Stockholm July 12–20, 1950. An invitation was read from the Fifth South American Congress of Chemistry inviting the Academy to participage in its proceedings to be held at Lima, Peru, May 4–11, 1951.

The Chairman of the Committee on Membership submitted the names of 25 nominees for resident membership. Fifteen individuals previously nominated were elected.

A letter from the American Association for the Advancement of Science indicated the amount of money available to the Academy for grants-in-aid of research.

Mrs. ANNIE M. KARRER was placed on the retired list, as of December 31, 1950.

Two deaths were reported: OAKES AMES, University Museum, Cambridge, Mass., on April 28, 1950 (elected June 8, 1931), and L. O. HOWARD, former chief of the Bureau of Entomology, on May 1, 1950 (original member; elected to honorary membership February 26, 1930).

The Treasurer reviewed the transaction concerning the purchase of Washington Sanitary

Improvement Co. stock held by the Academy and indicated that more than the necessary shares had been turned in to the Washington Loan & Trust Co. The President indicated that on the basis of rule 4 of the Standing Rules of the Board of Managers the reinvestment of the proceeds from the sale of these shares will be considered by the Executive Committee, which will report its action to the Board.

The meeting adjourned at 8:52 p.m.

F. M. SETZLER, *Secretary.*

Obituary

HENRI FRANÇOIS PITTIER, honorary member of the Washington Academy of Sciences, died on January 27, 1950, in Caracas, Venezuela.

Pittier was born at Bex, near the Rhone River, in the Bernese Alps, Switzerland, on August 13, 1857. He was educated in Swiss polytechnical schools and universities, receiving several degrees, including that of civil engineer and D.Sc., and also Ph.D. from Jena. He was in the Swiss Topographical Survey for two years and taught in Swiss universities for five years. In 1887 he went to Costa Rica, where he founded the Observatorio Meteorológico and the Instituto Físico-Geográfico and served as director of the latter. In his 18 years in Costa Rica he made extensive surveys, prepared the first accurate map of the country, and built up a great herbarium in the Instituto. Between 1891 and 1900 he published the *Primitiae florae Costaricensis*, with Th. Durand, J. Donnell-Smith, C. DeCandolle, Lindau, Pax, Engler, H. Christ, and others collaborating. He also published studies in anthropology, ethnography, and linguistics of the Indians of Costa Rica.

From January 1905 to October 1919 he served in the U. S. Department of Agriculture as botanist engaged in agricultural investigations in Central America. In 1910 he was in charge of the botanical survey of Panama under the Smithsonian Institution. While in the Department of Agriculture he explored all the countries of Central America and also Colombia and Venezuela, making extensive botanical collections, and publishing the results, especially on trees and woody plants, in the Contributions from the U. S. National Herbarium.

In 1913 and from March 1914 to March 1915, and again from February 1917 to February 1919, Dr. Pittier took leave without pay to work in Venezuela, and he resigned from the U. S. Department of Agriculture October 14, 1919, to go to Venezuela as director of the Museo Commercial. There, continuing his explorations of Venezuela, he built up a large herbarium. In 1933 he was made director of the National Observatory, and in 1936 was made director of the Servicio Botánico in the Ministry of Agriculture. Here he built up the National Herbarium and a large collection of wood samples of Venezuelan trees.

The Parque Nacional in Aragua and the Sociedad Venezolana de Ciencias Naturales were established through Pittier's influence. It was also through his efforts that a law was passed forbidding the burning of the forests on the mountain slopes, which were fast being destroyed by charcoal burners and others.

Dr. Pittier was recognized in Venezuela as the leading scientist of the country, and his ninetieth birthday, August 13, 1947, was celebrated by the Ministry of Agriculture and the learned societies. The Medal of the Order of the Libertador [Bolívar] and the Order of Francisco de Miranda were bestowed upon him by the Venezuelan Government. Dr. Pittier had interested himself in the higher education of young Venezuelans, and when an ample purse was presented to him on his birthday he designated that it was to form a fund for advanced education for Venezuelan students. He continued his botanical explorations until within a year of his death.

Dr. Pittier was naturalized while in the U. S. Department of Agriculture and maintained his citizenship of this country. He was a member of many learned societies in Europe and America and was an associate in botany in the Smithsonian Institution.

The Parque Nacional at Rancho Grande, Aragua, it is reported, is to be renamed the Henri Pittier International Biological Laboratory.

His bibliography includes over 300 papers on botany, forestry, Indian archeology, ethnography, and linguistics.

His home, surrounded by an extensive garden, with many of the beautiful orchids of Venezuela attached to the trees, was in a suburb of Caracas with a view of the distant mountains. Here he and his gracious wife extended hospitality to many visiting botanists.

AGNES CHASE.